MATHS

BOOKS - CENGAGE

PROBABILITY

Solved Examples And Exercises

1. A matrix is chosen at random from a set of all matrices of order 2 , with elements 0 or 1 only. The probability that the determinant of the matrix chosen is non-zero will be :

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2. A dice is rolled three times, find the probability of getting a larger number than the previous number each time.

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3. An integar is chosen at random and squared. Find the probability that the unit digit of the square is 1 or 5.

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4. The probability that a leap year will have 53 Fridays or 53 Saturdays is ....

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5. A laboratory blood test is 99% effective in detecting a certain disease when it is in fact, present. However, the test also yield a false positive result for 0.5% of the healthy person tested (i.e. if a healthy person is tested, then with probability 0.005, the test will imply he has the disease). If 0.1 percent of the population actually has the disease, what is the probability that a person has the disease given that his test result is positive?

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6. Die A has 4 red and 2 white faces, whereas die B has 2 red and 4 white faces. A coins is flipped once. If it shows a head, the game continues by throwing die A: if it shows tail, then die B is to be used. If the probability that die A is used is 32/33 when it is given that red turns up every time in first n throws, then find the value of n

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7. Each of the n urns contains 4 white and 6 black balls. The $(n+1)$ th urn contains 5 white and 5 black balls. One of the $n+1$ urns is chosen at random and two balls are drawn from it without replacement. Both the balls turn out to be black. If the probability that the $(n+1)$ th urn was chosen to draw the balls is 1/16, then find the value of n .

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8. On a normal standard dic one of the 21 dots from any one of the six faccs is removéd at random with each dot equally likely to be chosen. The die is then rolled. The probability that the top face has an odd number of dots is

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9. Suppose families always have one, two or three children, with probabilities 1/4, 1/2, and 1/4, respectively. Assume everyone eventually gets married and has children, then find the probability of a couple have exactly four grandchildren.

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10. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and

0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?

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11. A pack of playing cards was found to contain only 51 cards. If the first 13 cards, which are examined are all red, then the probability that the missing card is black is :-

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12. There are n letters and n addressed envelopes. Find the probability that all the letters are not kept in the right envelope.

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13. There are two bags, one of which contains 3 black and 4 white balls, while the other contains 4 black and 3 white balls. A fair die is cast, if the face 1 or 3 turns up, a ball is taken from the first bag, and if any other face turns up a ball is chosen from the second bag. Find the probability of choosing a black ball.

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14. An urn contains 5 red and 5 black balls. A ball is draw at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls of the colour drawn are put in the urn and then a ball is drawn at random. What is the probability that the second ball is red?

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15. If two events $A and B$ are such that $P(A) = 0.3; P(B) = 0.4; P(A \cap B) = 0.5$, then find the value of $P(B/A \cup B)$.

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16. The probability that certain electronic component fail, when first used is 0.10. If it does not fail immediately, then the probability that it lasts for one year is 0.99. What is the probability that a new component will last for one year?

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17. A die is thrown three times, if the first throw is a four, find the chance of getting 15 as the sum.

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18. Three coins are tossed. If one of them shows tail, then find thr probability that all three coins show tail.

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19. An urn contains 6 white and 4 black balls. A fair die is rolled and that number of balls we chosen from the urn. Find the probability that the balls selected are white.

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20. Consider a smmple space "S" representing the adults in a small town who have completed the requirements for a collage degree. They have been categorized according to sex and employement as follows :

An employed person is selected at random. Find the probability that the chosen one is a male.

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21. There are three coins. One is a two headed coin (having head on both faces), another is a biased coin that comes up heads 75% of the time and third is an unbiased coin. One of the three coins is chosen at random and tossed, it shows heads, what is the probability that it was the two headed coin?

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22. A real estate man has eight master keys to open several new homes. Only one master key will open any given hour. If 40% of these homes are usually left unlocked, what is the probability that the real estate man can get into a specific home if he selects three master keys at random before leaving the office?

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23. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are, drawn and are found to be both diamonds. Find the probability of the lost card being a diamond.

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24. An unbiased coin is tossed. If the outcome is a head, then a pair of unbiased dice is rolled and the sum of the number obtained on them is noted. If the toss of the coin results in tail, then a card from a well-shuffled pack of nine cards numbered 1, 2, 3, ..., 9 is randomly picked and the number on the card is noted. The probability that the noted number is either 7 or 8 is

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25. A number is selected at random from the first twenty-five natural numbers. If it is a composite number, then it is divided by 5. But if it is not a composite number, it is divided by 2. The probability that there will be no remainder in the division is

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26. The probability that a student is not a swimmer is $\frac{1}{5}$. Then the probability that out of five students, four are swimmers is (A) ${}^5C_4\left(\frac{4}{5}\right)^4\frac{1}{5}$

(B) $\left(\frac{4}{5}\right)^{4}\frac{1}{5}$ (C) ${}^{5}C_{1}\frac{1}{5}\left(\frac{4}{5}\right)^{4}$ (D) None of these

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27. $AandB$ are two candidates seeking admission in ITT. The probability that A is selected is 0.5 and the probability that $AandB$ are selected is at most 0.3. Is it possible that the probability of B getting selected is 0.9?

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28. Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is (A) $\frac{4}{5}$ (B) $\frac{1}{2}$ (C) $\frac{1}{5}$ (D) $\frac{2}{5}$

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29. An urn contains 4 balls. Two balls are drawn at random from the urn (without replacement) and are found to be white. What is the probability that all the four balls in the urn are white ?

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30. If two events A and B are such that $P\left(A^{l}\right) = 0.3$, $P(B) = 0.4$ and $P\left(A \cap B^{l}\right) = 0.5$, then $P\left(\frac{B}{A \cup B^{l}}\right)$ equals

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31. Determine P(E|F)

A coin is tossed three times, where

(i) E : head on third toss , F : heads on first two tosses

(ii) E : at least two heads , F : at most two heads

(iii) E : at most two tails F : at least one tail

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32. A and B play a series of gamed which cannot be drawn and p, q are their respective chances of winning a single game. What is the chance that A wins m games before B wins n games ?

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33. How many times must a man toss a fair coin so that the probability of having at least one head is more than 90%?

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34. Suppose that 90% of people are right- handed. What is the probability that atmost 6 of a random sample of 10 people are right- handed?

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35. A die is thrown 7 times. What is the chance that an odd number turns up (i) exactly 4 times (ii) at least 4 times

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36. Two dice are thrown. What is the probability that the sum of the numbers appearing on the two dice is 11, it 5 appears on the first?

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37. What is the probability of guessing correctly at least 8 out of 10 answer on true-false examination?

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38. An experiment succeeds twice as often as it fails, what is the probability that in the next five trials there will three successes.

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39. The probability that a particular day in the month of July is a rainy day is $\frac{3}{4}$. Two person whose credibility are $\frac{4}{5}$ and $\frac{2}{3}$, respectively, claim that 15th July was a rainy day. Find the probability that it was really a rainy day.

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40. A bag contains 10 white and 3 black balls. Balls are drawn one by one without replacement till all the black balls are drawn. Then find the probability that this procedure for drawing the balls will come to an end at the rth draw.

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41. The odds against a certain event are 5 to 2, and the odds in favor of another event independent of the former are 6 to 5. Find the chance that one at least of the events will happen.

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42. One of 10 keys open the door. If we try the keys one after another, then find the following: (i) The probability that the door is opened on the first attempt. (ii) The probability that the door is opened on the second attempt. (iii) The probability that the door is opened on the 10th attempt.

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43. An electrical system has open-closed switches $S_1, S_2 and S_3$ as shown in fig. The switches operate independently of one another and the current will flow from $A \rightarrow B$ either if S_1 is closed or if both $S_2 and S_3$ are closed. If $P(S_1) = P(S_2) = P(S_3) = 1/2,$ then find the probability that the circuit will work. fig

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44. A bag contains 3 white, 3 black and 2 red balls. One by one, three balls are drawn without replacing them. Find the probability that the third ball is red.

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45. The unbiased dice is tossed until a number greater than 4 appear. What is the probability that an even number of tosses is needed?

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46. X speaks truth in 60% and Y in 50% of the cases. Find the probability that they contradict each other narrating the same incident.

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47. In a bag, there are 6 balls of which 3 are white and 3 are black. They are drawn successively (i) without replacement. (ii) with replacement.

What is the chance that the colors are alternate? It has been supposed that the number of balls drawn remains the same, i.e., six even with replacement.

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49. A coin is tossed three times. Event A: two heads appear Event B: last should be head Then identify whether events $A and B$ are independent or dependent.

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50. Events $A and B$ are such that $P(A) = 1/2, P(B) = 7/12, and P(\neg A \text{ or } \neg B) = 1/4.$ State whether $A and B$

are independents?

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51. From a pack of 52 cards, two are drawn one by one without replacement. Find the probability that both of them are kings.

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52. A coin is tossed and a dice is rolled. Find the probability that the coin shows the head and the dice shows 6.

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53. The probability of happening an event A in one trial is 0.4. Find the probability that the event A happens at least one in three independent trials.

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54. A fair coin is tossed n times. if the probability that head occurs 6 times is equal to the probability that head occurs 8 times, then find the value of n.

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55. A, B, C in order draws a card from a pack of cards, replacing them after each draw, on condition that the first who draws a spade shall win a prize : find their respective chances.

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56. The probability of hitting a target by three marksmen are 1/2, 1/3 and 1/4. Then find the probabi9lity that one and only one of them will hit the target when they fire simultaneously.

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57. If $P(A \cup B) = 3/4 and P\left(\bar{A}\right) = 2/3$, then find the value of $P\left(\bar{A} \cap B\right)^{\cdot}$

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58. A box contains 6 nails and 10 nuts. Half of the nails and half of the nuts are rusted. If one item is chosen at random, then find the probability that it is rusted or is a nail.

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59. A fair coin is tossed repeatedly. If tail appears on first four tosses, then find the probability of head appearing on fifth toss.

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60. Let A, B, C be three events. If the probability of occurring exactly one event out of A and B is 1 - a, out of B and C is 1 - 2a, out of C and A is 1 - a and that of occuring three events simultaneously is a^2, then prove that probability that at least one out of A, B, C will occur is greater than 1/2.

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61. A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, 'the number is even,' and B be the event, 'the number is red'. Are A and B independent?

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62. If $P(A/B) = P(A/B')$, then prove that $AandB$ are independent.

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63. Find the probability of getting at least one tail in 4 tosses of a coin.

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64. If a dice is thrown twice, then find the probability of getting 1 in the first throw only.

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65. A die is thrown 4 times. Find the probability of getting at most two 6.

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66. A coin is tossed three times in succession. If E is the event that there are at least two heads and F is the event in which first throw is a head, then find $P(E/F)$.

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67. The probabilities of three mutually exclusive events are 2/3, 1/4, and 1/6. Is this statement correct?

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68. If $P(A \cap B) = \frac{1}{2}, P\left(\bar{A} \cap \bar{B}\right) = \frac{1}{3}, P(A) = p, P(B) = 2p,$ then find the value of p.

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69. If $AandB$ are events such that $P(A \cup B) = 3/4. P(A \cap B) = 1/4, andP\left(A^c\right) = 2/3$, then find (i) $P(A)$ (ii) $P(B)$ (iii) $P\left(A \cap B^c\right)$ (iv)$P\left(A^c \cap B\right)$

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70. Three students $AandBandC$ are in a swimming race. $AandB$ have the same probability of winning and each is twice as likely to win as C. Find the probability that the B or C wins. Assume no two reach the winning point simultaneously.

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71. A pack of 52 cards is divided at random into two equals parts. Find the probability that both parts will have an equal number of black and red cards.

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72. In a single throw of two dice what is the probability of obtaining a number greater than 7 , if 4 appears on the first dice?

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73. The probability of India winning a test match against West Indies is 1/2. Assuming independence from match to match, find the probability that in a match series Indias second win occurs at the third test.

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74. A bag contains a white and b black balls. Two players, A and B alternately draw a ball for the bag, replacing the ball each time after the draw till one of them draws a white ball and wins the game. A begins the game. If the probability of A winning the game is three times that or B, then find the ratio a: b .

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75. A binary number is made up of 8 digits. Suppose that the probability of an incorrect digit appearing is p and that the errors in different digits are independent of each other. Then find the probability of forming an incorrect number.

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76. The probability that Krishna will be alive 10 years hence is 7/15 and that Hari will be alive is 7/10. What is the probability that both Krishna and Hari will be dead 10 years hence?

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77. A bag contains 5 white and 3 black balls. Five balls are drawn successively without replacement. The probability that they are alternately of different colours is

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78. In a class of 125 students 70 passed in Mathematics, 55 in Statistics, and 30 in both. Then find the probability that a student selected at random from the class has passed in only one subject.

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79. The probability that at least one of $AandB$ occurs is 0.6. If $AandB$ occur simultaneously with probability 0.3, then find the value of $P\left(A^{\prime}\right)+P\left(B^{\prime}\right)$.

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80. Given two events A and B. If odds against A are as 2 : 1 and those in favor of A ∪ B are as 3 : 1, then find the range of P(B).

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81. An unbiased die is such that probability of number n appearing is proportional to $n^2(n = 1, 2, 3, 4, 5, 6)^{\cdot}$ The die is rolled twice, giving the numbers $aandb$. Then find the probability that $a < b$

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82. An unbiased dice, with faces numbered 1,2,3,4,5,6, is thrown n times and the list of n numbers shown up is noted. Then find the probability that among the numbers 1,2,3,4,5,6 only three numbers appear in this list.

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83. 2^n players of equal strength are playing a knock out tournament. If they are paired at randomly in all rounds, find out the probability that out of two particular players S_1 and S_2, exactly one will reach in semi-final $(n \in N, n \geq 2)$.

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84. The probabilities of three events A, B, and C are P(A) = 0.6, P(B) = 0.4, and P(C) = 0.5. If $P(A \cup B) = 0.8$, $P(A \cap C) = 0.3$, $P(A \cap B \cap C) = 0.2$, and $P(A \cup B \cup C) \geq 0.85$, then find the range of $P(B \cap C)$.

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85. The probability that at least one of the events $AandB$ occurs is 0.6. If $AandB$ occur simultaneously with probability 0.2, then find $P(\bar{A}) + P(\bar{B})$

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86. For the three events $A, B, and C, P$ (exactly one of the events A or B occurs) = P (exactly one of the two evens B or C) = P (exactly one of the events C or A occurs) = $pandP$ (all the three events occur simultaneously) = $p^2 where 0 < p < 1/2$. Then the probability of at least one of the three events $A, BandC$ occurring is a. $\frac{3p + 2p^2}{2}$ b. $\frac{p + 3p^2}{4}$ c. $\frac{p + 3p^2}{2}$ d. $\frac{3p + 2p^2}{4}$

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87. A man and a women appear in an interview for two vacancies in the same post. The probability of man's selection is 1/4 and that of the woman's selection is 1/3. What is the probability that none of them will be selected?

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88. A pair of unbiased dice are rolled together till a sum of "either 5 or 7" is obtained. Then find the probability that 5 comes before 7.

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89. Two friends A and B have equal number of daughters. There are three cinema tickets which are to be distributed among the daughters of A and B. The probability that all the tickets go to the daughters of A is 1/20. Find the number of daughters each of them have.

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90. A bag contains 12 pairs of socks. Four socks are picked up at random. Find the probability that there is at least one pair.

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91. Find the probability of getting a total of 5 or 6 in a single throw of two dice.

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92. Two integers are chosen at random and multiplied. Find the probability that the product is an even integar.

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93. If out of 20 consecutive whole numbers two are chosen at random, then find the probability that their sum is odd.

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94. A bag contains 3 red, 7 white, and 4 black balls. If three balls are drawn from the bag, then find the probability that all of them are of the same color.

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95. An ordinary cube has four blank faces, one face marked 2 and one face marked 3. Then find the probability of obtaining a total of exactly 12 in 5 throws.

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96. If the letters of the word "REGULATIONS" be arranged at random, find the probability that there will be exactly four letters between the R and the E.

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97. A five-digit number is formed by the digit 1, 2, 3, 4, 5 without repetition. Find the probability that the number formed is divisible by 4.

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98. The probability that a random chosen three-digit number has exactly 3 factors is

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99. A card is drawn from an ordinary pack of 52 cards and a gambler bets that, it is a spade or an ace. What are the odds against his wining this bet?

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100. A dice is loaded so that the probability of a face I is proportional to i^2 , I = 1, 2, ..., 6. Then find the probability of occurring a prime number when the dice is rolled.

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101. Out of 3n consecutive integers, three are selected at random. Find the probability that their sum is divisible by 3.

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102. Find the probability that the 3 N's come consecutively in the arrangement of the letters of the word "CONSTANTINOPLE".

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103. Two numbers a and b chosen at random from the set of first 30 natural numbers. Find the probability that $a^2 - b^2$ is divisible by 3.

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104. Twelve balls are distribute among three boxes. The probability that the first box contains three balls is a. $\frac{110}{9}\left(\frac{2}{3}\right)^{10}$ b. $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$ c.

$\frac{(12)C_3}{12^3} \times 2^9$ d. $\frac{(12)C_3}{3^{12}}$

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105. If ten objects are distributed at random among ten persons, then find the probability that at least one of them will not get any object.

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106. Find the probability that the birthdays of six different persons will fall in exactly two calender months.

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107. Two integers x and y are chosen with replacement out of the set {0, 1, 2, 3, ..., 10}. Then find the probability that $|x - y| > 5$.

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108. A box contains 2 black, 4 white, and 3 red balls. One ball is drawn at random from the box and kept aside. From the remaining balls in the box, another ball is drawn at random and kept aside the first. This process is repeated till all the balls are drawn front the box. The probability that the balls drawn are in the sequence of 2 black, 4 white, and 3 red is a.$1/1260$ b. $1/7560$ c. $1/126$ d. none of these

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109. Twelve balls are distribute among three boxes. The probability that the first box contains three balls is a.$\frac{110}{9}\left(\frac{2}{3}\right)^{10}$ b. $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$ c. $\frac{(12)C_3}{12^3}\times 2^9$ d. $\frac{(12)C_3}{3^{12}}$

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110. $AandB$ are two candidates seeking admission in ITT. The probability that A is selected is 0.5 and the probability that $AandB$ are selected is at most 0.3. Is it possible that the probability of B getting selected is 0.9?

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111. Let $A and B$ be two events. Suppose $P(A) = 0.4, P(B) = p, and P(A \cup B) = 0.7$. The value of p for which $A and B$ are independent is a. $1/3$ b. $1/4$ c. $1/2$ d. $1/5$

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112. Five different games are to be distributed among 4 children randomly. The probability that each child get at least one game is a. $1/4$ b. $15/64$ c. $5/9$ d. $7/12$

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113. A man has 3 pairs of black socks and 2 pair of brown socks kept together in a box. If he dressed hurriedly in the dark, the probability that after he has put on a black sock, he will then put on another black sock is $1/3$ b. $2/3$ c. $3/5$ d. $2/15$

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114. Two dice are rolled one after the other.The probability that the number on the first dice is smaller than that of the number on second dice is-

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115. A drawer contains 5 brown socks and 4 blue socks well mixed a man reaches the drawer and pulls out socks at random. What is the probability that they match? a. $4/9$ b. $5/8$ c. $5/9$ d. $7/12$

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116. A four figure number is formed of the figures 1, 2, 3, 5 with no repetitions. The probability that the number is divisible by 5 is a.$3/4$ b. $1/4$ c. $1/8$ d. none of these

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117. A natural number is chosen at random from the first 100 natural numbers. The probability that $x + \frac{100}{x} > 50$ is $1/10$ b. $11/50$ c. $11/20$ d. none of these

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118. If $AandB$ are two independent events such that $P(A) = 1/2andP(B) = 1/5,$ then a.$P(A \cup B) = 3/5$ b. $P(A/B) = 1/4$ c. $P(A/A \cup B) = 5/6$ d. $P\left(A \cap B/\bar{A} \cup \bar{B}\right) = 0$

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119. Let $A and B$ be two events such that $P\left(A \cap B'\right) = 0.20, P\left(A' \cap B\right) = 0.15, P\left(A' \cap B'\right) = 0.1, then P(A/B)$ is equal to $11/14$ b. $2/11$ c. $2/7$ d. $1/7$

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120. Mr. A lives at origin on the Cartesian plane and has his office at $(4, 5)$ His friend lives at $(2, 3)$ on the same plane. Mrs. A can go to his office travelling one block at a time either in the $+y$ or $+x$ direction. If all possible paths are equally likely then the probability that Mr. A passed his friends house is (shortest path for any event must be considere (a) $\frac{1}{2}$ (b) $\frac{10}{21}$ (c) $\frac{1}{4}$ (d) $\frac{11}{21}$

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121. An urn contains three red balls and n white balls. Mr. A draws two balls together from the urn. The probability that they have the same color is $1/2$. Mr.B draws one ball from the urn, notes its color and rplaces it. He then draws a second ball from the urn and finds that both balls have the same color is $5/8$. The value of n is ____.

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122. A hat contains a number of cards with 30% white on both sides, 50% black on one side and whit e on the other side, 20% black on both sides. The cards are mixed up, and a single card is drawn at random and placed on the table. Its upper side shows up black. The probability that its other side is also black is $2/9$ b. $4/9$ c. $2/3$ d. $2/7$

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123. If $a, b, \in \{1, 2, 3, 4, 5, 6, \}$, find the number of ways $aandb$ can be selected if $(\lim)_{x\vec{0}}\left(\frac{a^x + b^x}{2}\right)^{\frac{2}{x}} = 6.$

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124. An artillery target may be either at point I with probability 8/9 or at point II with probability 1/9 we have 55 shells, each of which can be fired either at point I or II. Each shell may hit the target, independent of the other shells, with probability 1/2. Maximum number of shells must be fired a point I to have maximum probability is a.20 b. 25 c. 29 d. 35

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125. All the jacks, queens, kings, and aces of a regular 52 cards deck are taken out. The 16 cards are throughly shuffled and may opponent, a person who always tells the truth, simultaneously draws two cards at random and says, "I hold at least one ace". The probability that he holds two aces is

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126. A person goes to office either by car, scooter, bus or train, the probability of which being 1/7, 3/7, 2/7 and 1/7, respectively. Probability that he reaches office late, if he taks car, scooter, bus or train is 2/9, 1/9, 4/9 and 1/9 respectively. Given that he reached office in time, then what is probability that he traveled by a car.

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127. If $A and B$ are two events such $P(A)=3/4$ and $P(B)=5/8$, then a. $P(A \cup B) \geq 3/4$ b. $P(A' \cap B) \leq 1/4$ c. $3/8 P(A \cap B) \leq 5/8$ d. $\frac{3}{8} \leq P(A \cap B) \leq 5/8$

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128. If $A and B$ are mutually exclusive events such that $P(A)=0.35 and P(B)=0.45$, find $P(A \cup B)$ (ii) $P(A \cap B)$ (iii) $P\left(A \cap B'\right)$ (iv) $P\left(A' \cap B'\right)$

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129. Let $A and B$ are events of an experiment and $P(A) = 1/4, P(A \cup B) = 1/2,$ then value of $P\left(B/A^c\right)$ is a.$2/3$ b. $1/3$ c. $5/6$ d. $1/2$

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130. Two buses A and B are scheduled to arrive at a town central bus station at noon. The probus A will be late is $\frac{1}{5}$. The probability that bus B will be late is $\frac{7}{25}$. The probability that the bus B is late given that bus A is late is $\frac{9}{10}$. Then the probabilities: neither bus will be late on a particular day.

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131. Three critics review a book. Odds in favor of the book are $5:2, 4:3,$ and $3:4,$ respectively, for the three critics. The probability that majority are in favor of the book is

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132. Three of six vertices of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral is (a) $\frac{1}{2}$ (b) $\frac{1}{5}$ (c) $\frac{1}{10}$ (d) $\frac{1}{20}$

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133. Let $AandB$ be two independent events. Statement 1: If $P(A) = 0.4andP\left(A \cup \bar{B}\right) = 0.9, thenP(B)is1/6.$ Statement 2: If $AandB$ are independent, then $P(A \cap B) = P(A)P(B)$.

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134. A bag contains n balls, one of which is white. The probability that $AandB$ speak truth are P_1andP_2, respectivley. One ball is drawn from the bag and $A and B$ both assert that it is white. Find the probability that drawn ball is actually white.

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135. Two players P_1 and P_2 are playing the final of a chess championship, which consists of a series of matches. Probability of P_1 winning a matic is 2/3 and that of P_2 is 1/3. Thus winner will be the one who is ahead by 2 games as compared to the other player and wins at least 6 games. Now, if the player P_2 wins the first four matches, find the probability of P_1 wining the championship.

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136. $A and B$ participate in a tournament of best of 7 games. It is equally likely that either A wins or B wins or the game ends in a draw. What is the probability that A wins the tournament.

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137. If p is the probability that a man aged x will die in a year, then the probability that out of n men A_1, A_2, A_n each aged x, A_1 will die in an year and be the first to die is a.$1 - (1 - p)^n$ b. $(1 - p)^n$ c. $1/n\left[1 - (1 - p)^n\right]$ d. $1/n(1 - p)^n$

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138. There are 3 bags which are known to contain 2 white and 3 black, 4 white and 1 black, and 3 white and 7 black ball, respectively. A ball is drawn at random from one of the bags and found to the black ball. Then the probability that it was drawn from the bag containing the most black ball is a.$7/15$ b. $5/19$ c. $3/4$ d. none of these

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139. A man alternately tosses a coin and throws a die beginning with the coin. The probability that he gets a head in the coin before he gets a 5 or

6 in the dice is a.$3/4$ b. $1/2$ c. $1/3$ d. none of these

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140. If A and B each toss three coins. The probability that both get the same number of heads is (a) $\frac{1}{9}$ (b) $\frac{3}{16}$ (c) $\frac{5}{16}$ (d) $\frac{3}{8}$

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141. If n integers taken at random are multiplied together , then the probability that the last digit of the product is 1, 3, 7, or 9 is a. $2^n/5^n$ b. 4^n - $2^n/5^n$ c. $4^n/5^n$ d. none of these

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142. A fair die is thrown 20 times. The probability that on the 10th throw, the fourth six appears is a.${}^{20}C_{10} \times 5^6/6^{20}$ b. $120 \times 5^7/6^{10}$ c. $84 \times 5^6/6^{10}$ d. none of these

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143. A is a set containing n different elements. A subset P of A is chosen. The set A is reconstructed by replacing the elements of P. A subset Q of A is again chosen. The number of ways of choosing P and Q so that $P \cap Q$ contains exactly two elements is (a). $.^{n}C_3 \times 2^n$ (b). $.^{n}C_2 \times 3^{n-2}$ (c). 3^{n-1} (d). none of these

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144. Consider $f(x) = x^3 + ax^2 + bx + c$ Parameters a, b, c are chosen as the face value of a fair dice by throwing it three times Then the probability that $f(x)$ is an invertible function is (A) $\frac{5}{36}$ (B) $\frac{8}{36}$ (C) $\frac{4}{9}$ (D) $\frac{1}{3}$

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145. An unbiased die is such that probability of number n appearing is proportional to $n^2(n = 1, 2, 3, 4, 5, 6)$. The die is rolled twice, giving the numbers $aandb$. Then find the probability that $a < b$

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146. In a knockout tournament 2^n equally skilled players, $S_1, S_2, \ldots. S_{2n}$, are participatingl. In each round, players are divided in pair at random and winner from each pair moves in the next round. If S_2 reaches the semi-final, then the probability that S_1 wins the tournament is 1/84. The value of n equals ______.

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147. Let $AandB$ be two events such that $P(A) = 3/5andP(B) = 2/3.$ Then Statement 1: $\frac{4}{15} \le P(A \cap B) \le \frac{3}{5}$· Statement 2: $2/5 \le P\left(\frac{A}{B}\right) \le 9/10.$

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148. A signal which can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then and 3 transmitted to station B. The probability of each station receiving the signal correctly is $\frac{3}{4}$ If the signal received at station B is green, then the probability that the original signal was green is (a) $\frac{3}{5}$ (b) $\frac{6}{7}$ (c) $\frac{20}{23}$ (d) $\frac{9}{20}$

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149. Thirty two players ranked 1 to 32 are playing is a knockout tournament. Assume that in every match between any two players, the better ranked player wins the probability that ranked 1 and ranked 2 players are winner and runner up, respectively, is $16/31$ b. $1/2$ c. $17/31$ d. none of these

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150. Two different numbers are taken from the set $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. The probability that their sum and positive difference are both multiple of 4 is $x/55$, then x equals ___.

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151. Two events A and B have probabilities 0.25 and 0.5, respectively. The probability that both A and B occur simultaneously is 0.14. then the probability that neither A nor B occurs is (A) 0.39 (B) 0.25 (C) 0.11 (D) none of these

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152. The probability of happening an event A in one trial is 0.4. Find the probability that the event A happens at least one in three independent trials.

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153. An unbaised die is thrown twice. Let the event A be "odd number on the first throw" and B be the event odd number on the second throw. Check the independence of the events A and B

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154. Fifteen coupens are numbered $1, 2, 3, \ldots 15$ respectively. Seven coupons are selected at random one at a time with replacement The Probability that the largest number appearing on a selected coupon is 9 is :

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155. The minimum number of times a fair coin needs to be tossed, so that the probability of getting at least two heads is at least 0.96 is :

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156. If $A and B$ are two events such that $P(A) = 0.6$ and $P(B) = 0.8$, if the greatest value that $P(A/B)$ can have is p, then the value of $8p$ is ______.

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157. If two events $A and B$ are such that $P(A) = 0.3; P(B) = 0.4; P\left(\bar{A} \cap \bar{B}\right) = 0.5$, then find the value of $P(B/A \cup B)$.

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158. Statement 1: if $A = \{2, 4, 6, \}, B\{1, 5, 3\} where A and B$ are the events of numbers occurring on a dice, then $P(A) + P(B) = 1.$ Statement 2: A_1, A_2, A_3, A_n are all mutually exclusive events, then $P\left(A_1\right) + P\left(A_2\right) + \; + P\left(A_n\right) = 1.$

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159. Let $A and B$ b e two independent events. Statement 1: If $(A) = 0.3 and P\left(A \cup \bar{B}\right) = 0.8, then P(B)$ is 2/7. Statement 2: $P(E) = 1 - P(E), where E$ is any event.

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160. A six-faced dice is so biased that it is twice as likely to show an even number as an odd number when thrown. It is thrown twice, the probability that the sum of two numbers thrown is even is a.$1/12$ b. $1/6$ c. $1/3$ d. $5/9$

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161. The probability that a marksman will hit a target is given is 1/5. Then the probability that at least once hit in 10 shots is a.$1 - (4/5)^{10}$ b. $1/5^{10}$ c. $1 - (1/5)^{10}$ d. $(4/5)^{10}$

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162. A coin is tossed (m + n) times $(m > n)$. Show that the probability of at least m consecutive heads is $(n+2)/2^{m+1}$.

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163. The probability that in a family of 5 members,exactly two members have birthday on sunday is:-

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164. A problem in mathematics is given to three students A, B, C and their respective probability of solving the problem is 1/2, 1/3 and 1/4. Probability that the problem is solved is a.$3/4$ b. $1/2$ c. $2/3$ d. $1/3$

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165. about to only mathematics

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166. A draws a card from a pack of n cards marked $1, 2, \ldots, n$ The card is replaced in the pack and B draws a card. Then the probability that A draws a higher card than B is a. $(n+1)2n$ b. $1/2$ c. $(n-1)2n$ d. none of these

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167. On a Saturday night, 20%of all drivers in U.S.A. are under the influence of alcohol. The probability that a drive under the influence of alcohol will have an accident is 0.001. The probability that a sober drive will have an accident is 0.0001. if a car on a Saturday night smashed into a tree, the probability that the driver was under the influence of alcohol is $3/7$ b. $4/7$ c. $5/7$ d. $6/7$

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168. A purse contains 2 six-sided dice. One is a normal fair die, while the other has two 1s two 3s,and two 5s. A die is picked up and rolled. Because of some secret magnetic attraction of the unfair die, there is 75% chance of picking the unfair die and a 25% chance of picking a fair die. The dice is rolled and shows up the face 3. The probability that a fair die was picked up is (a) $\frac{1}{7}$ (b) $\frac{1}{4}$ (c) $\frac{1}{6}$ (d) $\frac{1}{24}$

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169. The numbers 1, 2, 3, ..., n are arrange in a random order. The probability that the digits 1, 2, 3, .., $k(k < n)$ appear as neighbours in that order is (a)$1n!$ (b)$k!/n!$ (c) $(n - k)!/n!$ (d)$(n - k + 1)!/n!$

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170. Three houses are available in a locality. Three persons apply for the houses. Each applies for one houses without consulting others. The probability that all three apply for the same houses is a. $1/9$ b. $2/9$ c. $7/9$ d. $8/9$

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171. Thirty two players ranked 1 to 32 are playing is a knockout tournament. Assume that in every match between any two players, the better ranked player wins the probability that ranked 1 and ranked 2 players are winner and runner up, respectively, is (A) $\frac{16}{31}$ (B) $\frac{1}{2}$ (C) $\frac{17}{31}$ (D) none of these

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172. Three integers are chosen at random from the set of first 20 natural numbers. The chance that their product is a multiple of 3 is $194/285$ b. $1/57$ c. $13/19$ d. $3/4$

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173. A car is parked among N cars standing in a row, but not at either end. On his return, the owner finds that exactly r of the N places are still occupied. The probability that the places neighboring his car are empty is

a. $\frac{(r-1)!}{(N-1)!}$ b. $\frac{(r-1)!(N-r)!}{(N-1)!}$ c. $\frac{(N-r)(N-r-1)}{(N-1)(N+2)}$ d. $\frac{{}^{(N-r)}C_2}{.^{N-1}C_2}$

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174. One ticket is selected at random from 100 tickets numbered 00,01,02,...,98,99. Suppose S and T are the sum and product of the digits of the number on the ticket, then the probability of getting S=9 and T=0 is $2/19$ b. $19/100$ c. $1/50$ d. none of these

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175. If E and F events with $P(E) \leq P(F)$ and $P(E \cap F) > 0$, then (a) occurrence of E $\Rightarrow$ occurrence of F(b) occurrence of F $\Rightarrow$ occurrence of E (c) non-occurrence of E $\Rightarrow$ non-occurrence of F(d) none of the above implications hold

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176. A fair coin is tossed repeatedly. If tail appears on first four tosses, then find the probability of head appearing on fifth toss.

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177. A fair die is rolled once. Statement 1: the probability of getting a composite number is 1/3. Statement2: There are three possibilities for the obtained number (i) the number is a prime number, (ii) the number is a composite number, and (iii) the number is 1. Hence, probability of getting a prime number is 1/3.

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178. If from each of the three boxes containing 3 white and 1 black, 2 white and 2 black, 1 white and 3 black balls, one ball is drawn at random, then the probability that 2 white and 1 black balls will be drawn, is

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179. The probability that at least one of the events $A and B$ occurs is 0.6. If $A and B$ occur simultaneously with probability 0.2, then find $P\left(\bar{A}\right) + P\left(\bar{B}\right)$.

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180. For two given events $A and B, P(A \cap B) is$ (a)not less than $P(A) + P(B) - 1$ (b)not greater than $P(A) + P(B)$ (c)equal to $P(A) + P(B) - P(A \cup B)$ (d)equal to $P(A) + P(B) + P(A \cup B)$

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181. The probabilities that a student passes in Mathematics,Physics and Chemistry are m, p and c, respectively. Of these subjects, the student has a 75% chance of passing in at least one, a 50% chance of passing in at least two and a 40% chance of passing in exactly two. Which of the following relations are true?

A. P+M+C=19/20

B. P+M+C=27/20

C. PCM=1/10

D. PCM=1/4

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182. Seven white and 3 black balls are placed in a row. What is the probability if two black balls do not occur together ?

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183. India plays two matches each with West Indies and Australia. In any match the probabilities of India getting points $0, 1$ and 2 are

$0.45, 0.05$ and 0.50 respectively. Assuming that the outcomes are independent, the probability of India getting at least 7 points is (a) 0.8750 (b) 0.0875 (c) 0.0625 (d) 0.0250

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184. One hundred identical coins, each with probability p, of showing up heads are tossed once. If $0 < p < 1$ and the probability of heads showing on 50 coins is equal to that 51 coins, then value of p is, (A) $\frac{1}{2}$ (B) $\frac{49}{101}$ (C) $\frac{50}{101}$ (D) $\frac{51}{101}$

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185. The probability of India winning a test match against West Indies is $\frac{1}{2}$. Assuming independence from match to match, find the probability that in a match series India's second win occurs at the third test.

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186. An unbiased die with faced marked $1, 2, 3, 4, 5,$ and 6 is rolled four times. Out of four face value obtained, the probability that the minimum face value is not less than 2 and the maximum face value is not greater than five is then (a) $\frac{16}{81}$ (b) $\frac{1}{81}$ (c) $\frac{80}{81}$ (d) $\frac{65}{81}$

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187. For the three events $A, B, andC, P$ (exactly one of the events A or B occurs) $= P$ (exactly one of the two evens B or C) $= P$ (exactly one of the events C or A occurs) $= pandP$ (all the three events occur simultaneously) $= p^2 where 0 < p < 1/2.$ Then the probability of at least one of the three events $A, BandC$ occurring is a. $\frac{3p + 2p^2}{2}$ b. $\frac{p + 3p^2}{4}$ c. $\frac{p + 3p^2}{2}$ d. $\frac{3p + 2p^2}{4}$

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188. A bag contains 12 red balls 6 white balls. Six balls are drawn one by one without replacement of which at least 4 balls are white. Find the probability that in the next two drawn exactly one white ball is drawn. (Leave the answer in ${}^{n}C_{r}$).

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189. Two numbers are selected randomly from the set $S = \{1, 2, 3, 4, 5, 6\}$ without replacement one by one. The probability that minimum of the two numbers is less than 4 is (a) $\frac{1}{15}$ (b) $\frac{14}{15}$ (c) $\frac{1}{5}$ (d) $\frac{4}{5}$

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190. If three distinct number are chosen randomly from the first 100 natural numbers, then the probability that all three of them are divisible by both 2 and 3 is (a) $\frac{4}{25}$ (b) $\frac{4}{35}$ (c) $\frac{4}{33}$ (d) $\frac{4}{1155}$

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191. If $P(B) = 3/4, P\left(A \cap B \cap \bar{C}\right) = 1/3$ and $P\left(\bar{A} \cap B \cap \bar{C}\right) = 1/3, thenP(B \cap C)$ is a. $1/12$ b. $1/6$ c. $1/16$ d. $1/9$

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192. $AandB$ are two independent events. C is event in which exactly one of A or B occurs. Prove that $P(C) \geq P(A \cup B)P(\bar{A} \cap \bar{B})$

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193. Let $AandB$ be two event such that $P(A \cup B) \geq 3/4$ and $1/8 \leq P(A \cap B) \leq 3/8.$ Statement 1: $P(A) + P(B) \geq 7/8.$ Statement 2: $P(A) + P(B) \leq 11/8.$

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194. There are two red, two blue, two white, and certain number (greater than 0) of green socks in a drawer. If two socks are taken at random from the drawer without replacement, the probability that they are of the same color is 1/5, then the number of green socks are _______.

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195. A drawer contains a mixture of red socks and blue socks, at most 17 in all. It so happens that when two socks are selected randomly without replacement, there is a probability of exactly 1/2 that both are red or blue. The largest possible number of red socks in the drawer that is consistent with this data is ______.

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196. If the probability that the product of the outcomes of three rolls of a fair dice is a prime number is p, then the value of $1/(4p)$ is____.

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197. If two loaded dice each have the property that 2 or 4 is three times as likely to appear as 1, 3, 5, or 6 on each roll. When two such dice are rolled, the probability of obtaining a total of 7 is p, then the value of$[1/p]$ is, where $[x]$ represents the greatest integer less than or equal to x.

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198. If the probability of a six digit number N whose six digit are 1,2,3,4,5,6 written as random order is divisible by 6 is p, then the value of $1/p$ is________.

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199. The probability that a random chosen three-digit number has exactly 3 factors is

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200. There are 3 bags. Bag 1 contains 2 red and $a^2 - 4a + 8$ black balls, bag 2 contgais 1 red and $a^2 - 4a + 9$ black balls, and bag 3 contais 3 red and $a^2 - 4a + 7$ black balls. A ball is drawn at random from at random chosen bag. Then the maximum value of probability that it is a red ball is a.$1/3$ b. $1/2$ c. $2/9$ d. $4/9$

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201. A bag has 10 balls. Six balls are drawn in an attempt and replaced. Then another draw of 5 balls is made from the bag. The probability that exactly two balls are common to both the draw is

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202. If three squares are selected at random from chessboard, then the probability that they form the letter "L" is

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203. Forty teams play a tournament. Each team plays every other team just once. Each game results in a win for one team. If each team has a 50% chance of winning each game, the probability that at the end of the tournament, every team has won a different number of games is

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204. Five different games are to be distributed among 4 children randomly. The probability that each child get at least one game is $1/4$ b. $15/64$ c. $5/9$ d. $7/12$

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205. Whenever horses a, b, c race together, their respective probabilities of winning the race are 0.3, 0.5, and 0.2 respectively. If they race three times, the probability that the same horse wins all the three races, and the probability that a, b, c each wins one race are, respectively. a. $8/50, 9/50$ b. $16/100, 3/100$ c. $12/50, 15/50$ d. $10/50, 8/50$

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206. A fair die is tossed repeatedly. A wins if if is 1 or 2 on two consecutive tosses and B wins if it is 3,4,5 or 6 on two consecutive tosses. The probability that A wins if the die is tossed indefinitely is a.$1/3$ b. $5/21$ c. $1/4$ d. $2/5$

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207. Let ω be a complex cube root of unity with $\omega \neq 1$. A fair die is thrown three times. If r_1, r_2 and r_3 are the numbers obtained on the die, then the probability that $\omega^{r_1} + \omega^{r_2} + \omega^{r_3} = 0$ is

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208. For a student to qualify, he must pass at least two our three exams. The probability that he will pass the first exam is p. If he fails in one of the exams then the probability of his passing in the next is p/2, otherwise it remains the same. Find the probability that he will qualify.

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209. Three boys and two girls stand in a queue. The probability, that the number of boys ahead is at least one more than the number of girls ahead of her, is `

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210. Four persons independently solve a certain problem correctly with proabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then the probability that the problem is solved correctly by at least one of them is

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211. A box contains 24 identical balls of which 12 are white and 12 are black. The balls are drawn at random from the box one at a time with replacement. The probability that a white ball is drawn for the 4th time on the 7th draw is $5/64$ b. $27/32$ c. $5/32$ d. $1/2$

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212. A six-faced fair dice is shown until 1 comes. Then the probability that 1 comes in even number of trials is (a) $\frac{5}{11}$ (b) $\frac{5}{6}$ (d) $\frac{6}{11}$ (d) $\frac{3}{28}$

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213. A is targeting to B, B and C are targeting to A. probability of hitting the target by A, B and C are 2/3, 1.2 and 1/3, respectively. If A is hit, then find the Probability that B hits the target and C does not.

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214. A student appears for tests I, II and III. The student is considered successful if he passes in tests I, II or I, III or all the three. The probabilities of the Student passing in tests II and III are m, n and $\frac{1}{2}$ respectively. If the probability of the student to be successful is $\frac{1}{2}$, then which one of the following is correct? (a) $m(1+n)=1$ (B) $n(1+m)=1$ (C) $m=1$ (D) $mn=1$

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215. $EandF$ are two independent events. The probability that both $EandF$ happen is $\frac{1}{12}$ and the probability that neither $EandF$ happens is $\frac{1}{2}$. Then,

$A)P(E)=1/3, P(F)=1/4$ $B)P(E)=1/4, P(F)=1/3$

$C)P(E)=1/6, P(F)=1/2$ $D)P(E)=1/2, P(F)=1/6$

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216. If A, B, C be three mutually independent events, then $AandB \cup C$ are also independent events. Statement 2: Two events $AandB$ are independent if and only if $P(A \cap B) = P(A)P(B)$.

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217. Let E be an event which is neither a certainty nor an impossibility. If probability is such that $P(E) = 1 + \lambda + \lambda^2$ and $P\left(E'\right) = (1 + \lambda)^2$ in terms of an unknown λ. Then $P(E)$ is equal to

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218. A student can solve 2 out of 4 problems of mathematics, 3 out of 5 problem of physics, and 4 out of 5 problems of chemistry. There are equal number of books of math, physics, and chemistry in his shelf. He selects one book randomly and attempts 10 problems from it. If he solves the first problem, then the probability that he will be able to solve the second problem is a. $\frac{2}{3}$ b. $\frac{25}{38}$ c. $\frac{13}{21}$ d. $\frac{14}{23}$

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219. An unbiased cubic die marked with 1,2,2,3,3,3 is rolled 3 times. The probability of getting a total score of 4 or 6 is (A) $\frac{16}{216}$ (B) $\frac{50}{216}$ (C) $\frac{60}{216}$ (D) none of these

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220. A bag contains 3 red and 3 green balls and a person draws out 3 at random. He then drops 3 blue balls into the bag and again draws out 3 at random. The chance that the 3 later balls being all of different colors is a. 15% b. 20% c. 27% d. 40%

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221. The probability that an automobile will be stolen and found within one week is 0.0006. Then probability that an automobile will be stolen is 0.0015. the probability that a stolen automobile will be found in the week is 0.3 b. 0.4 c. 0.5 d. 0.6

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222. A pair of numbers is picked up randomly (without replacement) from the set {1,2,3,5,7,11,12,13,17,19}. The probability that the number 11 was picked given that the sum of the numbers was even is nearly a.0.1 b. 0.125 c. 0.24 d. 0.18

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223. A dice is thrown six times, it being known that each time a different digit is shown. The probability that a sum of 12 will be obtained in the first three throws is

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224. A composite number is selected at random from the first 30 natural numbers and it is divided by 5. The probability that there will be a remainder is

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225. A bag contains 20 coins. If the probability that the bag contains exactly 4 biased coin is 1/3 and that of exactly 5 biased coin is 2/3, then the probability that all the biased coin are sorted out from bag is exactly 10 draws is

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226. A doctor is called to sea a stick child. The doctor knows (prior to the visit) that 90% of the sick chideren in that neighborhood are sick with the flu, denoted by F, white 10% are sick children in that neighborhood are sick with the flu, denoted by F, while 10% are sick with the measles, denoted by M.A wellknow symptom of measles is a rash, denoted by R.The probability of having a rash for a child stick with the measles is 0.95. However, occasionally children with the flu also develop a rash, with conditional probability 0.08. Upon examination the child, the doctor finds a rash. Then what is the probability that the child has the measles ?

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227. A fair coin is flipped n times. Let E be the event "a head is obtained on the first flip" and let F_k be the event "exactly k heads are obtained". Then the value of n/k for which E and F_k are independent is _____.

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228. Two cards are drawn from a well shuffled pack of 52 cards. The probability that one is heart card and the other is a king is p, then the value of 104p is____.

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229. Let $S = \{1, 2, 3, \ldots, 40\}$ and let A be a subset of S such that notwo elements in A have their sum divisible by 5. What is themaximum number of elements possible in A?

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230. A bag contains 10 different balls. Five balls are drawn simultaneously and then replaced and then seven balls are drawn. If the probability that exactly three balls are common to the two draws is p, then the value of 8p is ______.

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231. Two numbers a, b are chosen from the set of integers 1, 2, 3, ..., 39. Then probability that the equation 7a - 9b = 0 is satisfied is

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232. Statement 1: Out of 5 tickets consecutively numbered, three are drawn at random. The chance that the numbers on them are in A.P. is 2/15. Statement 2: Out of $2n + 1$ tickets consecutively numbed, three are drawn at random, the chance that the numbers on them are in A.P. is $3n/\left(4n^2 - 1\right)$.

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233. An unbiased normal coin is tossed n times. Let

E_1: event that both heads and tails are present in n tosses.

E_2: event that the coin shows up heads at most once.

The value of n for which E_1 and E_2 are independent is _____.

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234. Two numbers x and y are chosen at random (without replacement) from among the numbers $1, 2, 3, 2004$. The probability that $x^3 + y^3$ is divisible by 3 is (a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{4}$

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235. Eight players $P_1, P_2, \ldots, P_8$ play a knock-out tournament. It is known that whenever the players P_i and P_j play, the player P_i will win if $i < j$. Assuming that the players are paired at random in each round, what is the probability that the player P_4 reaches the final?

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236. A cricket club has 15 members, of them of whom only 5 can bowl. If the names of 15 members are put into a box and 11 are drawn at random, then the probability of getting an eleven containing at least 3 bowlers is a.$7/13$ b. $6/13$ c. $11/158$ d. $12/13$

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237. A speaks truth in 60% cases and B speaks truth in 70% cases. The probability that they will say the same thing while describing a single event is (A) $\frac{2}{19}$ (B) $\frac{3}{29}$ (C) $\frac{17}{19}$ (D) 0.54

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238. There are 20 cards. Ten of these cards have the letter I printed on them and the other 10 have the letter T printed on them. If three cards picked up at random and kept in the same order, the probability of making word IIT is

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239. If n persons are seated on a round table, what is the probability that two named individuals will be neighbours?

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240. The sum of two positive quantities is equal to 2n. Find the probability that their product is not less than $3/4$ times their greatest product.

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241. A bag contains an assortment of blue and red balls. If two balls are drawn at random, the probability of drawing two red balls is five times the probability of drawing two blue balls. Furthermore, the probability of drawing one ball of each color is six time the probability of drawing two balls. The number of red and blue balls in the bag is a.$6, 3$ b. $3, 6$ c. $2, 7$ d. none of these

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242. Dialing a telephone number an old man forgets the last two digits remembering only that these are different dialed at random. The probability that the number is dialed correctly is

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243. The box contains tickets numbered from 1 to 20. Three tickets are drawn from the box with replacement. The probability that the largest number on the tickets is 7 is (A) $\frac{2}{19}$ (B) $\frac{7}{20}$ (C) $1 - \left(\frac{7}{200}\right)^3$ (D) none of these

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244. A fair coin is tossed n times. if the probability that head occurs 6 times is equal to the probability that head occurs 8 times, then find the value of $\dot{n}$

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245. One ticket is selected at random from 100 tickets numbered 00,01,02,...,98,99. If $x_1, andx_2$ denotes the sum and product of the digits on the tickets, then $P\left(x_1 = 9/x_2 = 0\right)$ is equal to a.$2/19$ b. $19/100$ c. $1/50$ d. none of these

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246. Four numbers are multiplied together. Then the probability that the product will be divisible by 5 or 10 is a.$369/625$ b. $399/625$ c. $123/625$ d. none of these

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247. Cards are drawn one by one without replacement from a pack of 52 cards. The probability that 10 cards will precede the first ace is a.$\frac{241}{1456}$ b. $\frac{18}{625}$ c. $\frac{451}{884}$ d. none of these

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248. If odds against solving a question by three students are 2:1, 5:2, and 5:3, respectively, then probability that the question is solved only by one student is a.$31/56$ b. $24/56$ c. $25/56$ d. none of these

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249. If $P(A)=\frac{1}{3}, P(B)=\frac{2}{4}, P(A\cup B)=\frac{1}{4}$ then find $P(A\cap B)$

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250. There are two urns $AandB$. Urn A contains 5 red, 3 blue and 2 white balls, urn B contains 4 red, 3 blue, and 3 white balls. An urn is chosen at random and a ball is drawn. Probability that ball drawn is red is a.$9/10$ b. $1/2$ c. $11/20$ d. $9/20$

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251. An unbiased coin is tossed 6 times. The probability that third head appears on the sixth trial is a.$5/16$ b. $5/32$ c. $5/8$ d. $5/64$

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252. $A and B$ are two independent events. The probability that both $A and B$ occur is 1/6 and the probability that neither of them occurs is 1/3. Find the probability of the occurrence of $\dot{A}$

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253. In a certain city, only 2 newspapers A and B are published. It is known that 25% of the city population read A and 20% read B while 8% reads both A and B. It is also known that 30% of those who read A but not B look into advertisement and 40% of those who read B but not A look into advertisements while 50% of those who read both A and B look into advertisements. What is the percentage of the population who read an advertisement?

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254. Cards are drawn one by one at random from a well suffied full pack of 52 playing card until 2 aces are obtained for the first time. Then prove that probability that exactly n cards are drawn, is

$\frac{n-1(52-n)(51-n)}{50 \times 49 \times 17 \times 13}$, $where 2 < n \leq 50$.

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255. Three ships $A, B, and C$ sail from England to India. If the ratio of their arriving safely are 2:5, 3:7, and 6:11, respectively, then the probability of all the ships for arriving safely is a. $\frac{18}{595}$ b. $\frac{6}{17}$ c. $\frac{3}{10}$ d. $\frac{2}{7}$

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256. Six boys and six girls sit in a row randomly. Find the probability that (i) the six girls sit together, (ii) the boys and girls sit alternately.

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257. In a multiple choice question, there are four alternative answers of which one or more than one is correct. A candidate will get marks on the question only if he ticks the correct answer. The candidate dicides to tick answers at random. If he is allowed up to three chances to answer the question, then find the probability that he will get marks on it.

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258. A lot contains 20 articles. The probability that the lot contains exactly 2 defective articles is 0.4 and the probability thatthe lot contains exactly 3 defective articles is 0.6. Articles are drawn in random one by one without replacement andtested till all the defective articles are found. What is the probability that the testing procedure ends at the twelfth testing ?

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259. A fair coin is tossed 100 times. The probability of getting tails 1, 3, .., 49 times is $1/2$ b. $1/4$ c. $1/8$ d. $1/16$

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260. Three player A, B and C, toss a coin cyclically in that order (that is $A, B, C, A, B, C, A, B, \ldots$) till a headshows. Let p be the probability that the coin shows a head. Let α, β and γ be, respectively, theprobabilities that A, B and C gets the first head. Then

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261. One Indian and four American men and their wives are to be seated randomly around a circular table. Then the conditional probability that the Indian man is seated adjacent to his wife given that each American man is seated adjacent to his wife is

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262. A pair of unbiased dice are rolled together till a sum of either 5 or 7 is obtained. Then find the probability that 5 comes before 7.

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263. Consider the system of equations $ax + by = 0$; $cx + dy = 0$, where $a, b, c, d \in \{0, 1\}$)STATEMENT-1: The probability that the system of equations has a unique solution is 3/8 STATEMENT-2: The probability that the system of equations has a solution is 1

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264. Let A, B, C be three mutually independent events. Consider the two statements $S_1 and S_2$ $S_1 : A and B \cup C$ are independent $S_2 : A and B \cap C$ are independent Then, a. both $S_1 and S_2$ are true b. only S_1 is true c. only S_2 is true d. neither $S_1 n$ or S_2 is true

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265. Statement 1: If $P(A) = 0.25, P(B) = 0.50, and P(A \cap B) = 0.14$, then the probability that neither A nor B occurs is 0.39. Statement 2:

$\overline{\left(A \cup B\right)} = \bar{A} \cup \bar{B}$.

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266. 2n boys are randomly divided into two subgroups containing n boys each. The probability that the two tallest boys are in different groups is

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267. If a is an integer lying in $[-5, 30]$, then the probability that the probability the graph of $y = x^2 + 2(a+4)x - 5a + 64$ is strictly above the x-axis is

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268. In a game called "odd man out" m $(m > 2)$ persons toss a coin a determine who will buy refreshments for the entire group. A person who gets an outcome different from that of the rest of the members of the group is called the odd man out. The probability that there is a loser in any game is

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269. Two players toss 4 coins each. The probability that they both obtain the same number of heads is a.$5/256$ b. $1/16$ c. $35/128$ d. none of these

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270. A father has 3 children with at least one boy. The probability that he has 2 boys and 1 girl is a.$1/4$ b. $1/3$ c. $2/3$ d. none of these

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271. Cards are drawn one-by-one at random from a well-shuffled pack of 52 playing cards until 2 aces are obtained from the first time. The probability that 18 draws are obtained for this is a.$3/34$ b. $17/455$ c. $561/15925$ d. none of these

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272. A and B toss a fair coin each simultaneously 50 times. The probability that both of them will not get tail at the same toss is

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273. Let $AandB$ be two events such that $P\left(A\cap B'\right)=0.20, P\left(A'\cap B\right)=0.15, P\left(A'\cap B'\right)=0.1, thenP(A/B)$ is equal to $11/14$ b. $2/11$ c. $2/7$ d. $1/7$

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274. A $2n$ digit number starts with 2 and all its digits are prime, then the probability that the sum of all 2 consecutive digits of the number is prime is

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275. The numbers (a, b, c) are selected by throwing a dice thrice, then the probability that (a, b, c) are in A.P. is a.$1/12$ b. $1/6$ c. $1/4$ d. none of these

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276. In a n-sided regular polygon, the probability that the two diagonal chosen at random will intersect inside the polygon is

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277. A three-digit number is selected at random from the set of all three-digit numbers. The probability that the number selected has all the three digits same is

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278. Words from the letters of the word PROBABILITY are formed by taking all letters at a time. The probability that both B's are not together and both I's are not together is

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279. The probability of winning a race by three persons A, B , and C are $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{4}$, respectively. They run two races. The probability of A winning the second race when B , wins the first race is (A) $\frac{1}{3}$ (B) $\frac{1}{2}$ (C) $\frac{1}{4}$ (D) $\frac{2}{3}$

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280. A die is rolled 4 times. The probability of getting a larger number than the previous number each time is a.$17/216$ b. $5/432$ c. $15/432$ d. none of these

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281. A die is thrown three times, find the probability that 4 appears on the third toss if it is given that 6 and 5 appear respectively on first two tosses.

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282. In a competitive examination, an examinee either guesses or copies or knows the answer to amultiple choice question with four choices. The probability that he makes a guess is $\frac{1}{3}$ and the probability that he copies the answer is 1/6. The probability that the answer is correct, given that he copiedit, is $\frac{1}{8}$. Find the probability that he knows the answer to the question, given that he correctly answered

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283. A is a set containing n elements. A subset P_1 of A is chosen. The set A is reconstructed by replacing the elements P Next, a of subset P_2 of A is chosen and again the set is reconstructed by replacing the elements of

P_2, In this way, m subsets $P_1, P_2 \dots, P_m$ of A are chosen. The number of ways of choosing $P_1, P_2, P_3, P_4 \dots P_m$

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284. Numberse are selected at random, one at a time, from the two-digit numbers 00,01,02,....99 with replacement. An event E occurs if and only if the product of the two digits of a selected number is 18. If four numbers are selected, find probability that the event E occurs at least 3 times.

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285. A lot contains 50 defective and 50 non-defective bulbs.Two bulbs are drawn at random, one at a time, with replacement. The events A,B and C are defined as follows:

A= (first bulb is detective)

B= (second bulb is non-defective)

C= (two bulbs are both defective or both non-defective)

Then

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286. An urn contains m white and n black balls. A ball is drawn at random and is put back into the urn along with k balls of the same colour as that of the ball drawn. a ball is again drawn at random. Show that the probability of drawing a white ball now does not depend on k.

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287. If $A and B$ are two independent events such that $P(A) = 1/2 and P(B) = 1/5$, then $P(A \cup B) = 3/5$ b. $P(A/B) = 1/4$ c. $P(A/A \cup B) = 5/6$ d. $P(A \cap B/A \cup B) = 0$

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288. Suppose the probability for A to win a game against B is 0.4. If A has an option of playing either a “best of 3 games" or a “best of 5 games match against B, which option should be chosen so that the probability of his winning the match is higher? (No game ends in a draw.)

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289. A box contains two 50-paise coins, five 25-paise coin and a certain fixed number $N(\geq 2)$ of 10 and 5-paise coins. Five coins are taken out of the box at random. Find the probability that the total value of these 5 coins is less than 1 rupee and 50 paise.

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290. In how many ways three girls and nine boys can be seated in two vans, each having numbered seats, 3 in the front and 4 at the back? How many seating arrangements are possible if 3 girls sit together in a back row on adjacent seats?

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291. Five different marbles are placed in 5 different boxes randomly. Then the probability that exactly two boxes remain empty is (each box can hold any number of marbles)

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292. There are 10 prizes, five A's, there B's, and two C's placed in identical sealed envelopes for the top 10 contestants in a mathematics contest. The prizes are awarded by allowing winners to select an envelope at random from those remaining. When the 8th contestant goes to select the prize, the probability that the remaining three prizes are one A, one B and one C is

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293. A man takes a step forward with probability 0.4 and backward with probability 0.6. Find the probability that at the end of 11 steps, he is one step away from the starting point.

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294. An unbiased coin is tossed. If the outcome is a head, then a pair of unbiased dice is rolled and the sum of the number obtained on them is noted. If the toss of the coin results in tail, then a card from a well-shuffled pack of nine cards numbered 1, 2, 3, ..., 9 is randomly picked and the number on the card is noted. The probability that the noted number is either 7 or 8 is

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295. A bag contains 20 coins. If the probability that the bag contains exactly 4 biased coin is 3/4 and that of exactly 5 biased coin is 2/3, then the probability that all the biased coin are sorted out from bag is exactly 10 draws is $\frac{5}{10}\frac{\wedge(16)C_6}{\wedge(20)C_9}+\frac{1}{11}\frac{\wedge(15)C_5}{\wedge(20)C_9}$ b. $\frac{2}{33}\left[\frac{\wedge(16)C_6+5^{15}C_5}{\wedge(20)C_9}\right]$ c. $\frac{5}{33}\frac{\wedge(16)C_7}{\wedge(20)C_9}+\frac{1}{11}\frac{\wedge(15)C_6}{\wedge(20)C_9}$ d. none of these

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296. If p and q are chosen randomly from the set {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} with replacement then determine the probability that the roots of the equation $x^2 + px + q = 0$ are real.

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297. Two numbers are selected randomly from the set $S = \{1, 2, 3, 4, 5, 6\}$ without replacement one by one. The probability that minimum of the two numbers is less than 4 is $1/15$ b. $14/15$ c. $1/5$ d. $4/5$

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298. In a precision bombing attack, there is a 50% chance that any one bomb will strick the target. Two direct hits are required to destroy the target completely. The number of bombs which should be dropped to give a 99% chance or better of completely destroying the target can be

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299. If A and B are arbitrary events, then a) $P(A \cap B) \geq P(A) + P(B)$ (b) $P(A \cup B) \leq P(A) + P(B)$ (c) $P(A \cap B) = P(A) + P(B)$ (d)None of these

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300. One mapping is selected at random from all mappings of the set $S = \{1, 2, 3, n\}$ into itself. If the probability that the mapping is one-one is $\frac{3}{32}$, then the value of n

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301. A fair coin is tossed 100 times. The probability of getting tails 1, 3, .., 49 times is $1/2$ b. $1/4$ c. $1/8$ d. $1/16$

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302. South African cricket captain lost the toss of a coin 13 times out of 14. The chance of this happening was

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303. Events $A and C$ are independent. If the probabilities relating $A, B, and C$ are $P(A) = 1/5, P(B) = 1/6; P(A \cap C) = 1/20; P(B \cup C) = 3/8.$ Then (a)events $B and C$ are independent (b)events $B and C$ are mutually exclusive events.(c) $B and C$ are neither independent nor mutually exclusive (d)events $B and C$ are equiprobable

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304. Statement 1: The probability of drawing either an ace or a king from a pack of card in a single draw is 2/13. Statement 2: for two events $A and B$ which are not mutually exclusive, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

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305. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is (A) $\frac{3}{5}$ (B) $\frac{1}{5}$ (C) $\frac{2}{5}$ (D) $\frac{4}{5}$

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306. Let A and B be two events such that $p\left(\overline{A \cup B}\right) = \frac{1}{6}, p(A \cap B) = \frac{1}{4}$ and $p\left(\bar{A}\right) = \frac{1}{4}$, where $\bar{A}$ stands for the complement of the event A. Then the events A and B are (1) mutually exclusive and independent (2) equally likely but not independent (3) independent but not equally likely (4) independent and equally likely

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307. A die is thrown once. If probability of getting even

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308. A pair of fair dice is thrown independently three times. The probability of getting a score of exactly 9 twice is

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309. Let A, B, C, D be independent events such that $P(A) = 1/2, P(B) = 1/3, P(C) = 1/5, andP(D) = 1/6.$ Then theprobability that none of $A, B, C, andD$ occurs a.$1/180$ b. $1/45$ c. $1/18$ d. none of these

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310. A sample space consists of 3 sample points with associated probabilities given as $2p, p^2, 4p - 1.$ Then the value of p is a.$p = \sqrt{11} - 3$ b. $\sqrt{10} - 3$ c. $\frac{1}{4} \leq p \leq \frac{1}{2}$ d. $\left(10 \times 6^3\right)7^5$

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311. Words from the letters of the word PROBABILITY are formed by taking all letters at a time. The probability that both B's are not together and both I's are not together is

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312. A class consists of 80 students, 25 of them are girls and 55 are boys. If 10 of them are rich and the remaining are poor and also 20 of them are intelligent, then the probability of selecting an intelligent rich girls is a. $5/128$ b. $25/128$ c. $5/512$ d. none of these

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313. $AandB$ play a game of tennis. The situation of the game is as follows: if one scores two consecutive points after a deuce, he wins; if loss of a point is followed by win of a point, it is deuce. The chance of a server to win a point is 2/3. The game is a deuce and A is serving. Probability that A

will win the match is (serves are change after each game) a.$3/5$ b. $2/5$ c. $1/2$ d. $4/5$

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314. If the papers of 4 students can be checked by any one of the 7 teachers, then the probability that all the 4 papers are checked by exactly 2 teachers is a.$2/7$ b. $12/49$ c. $32/343$ d. none of these

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315. Let A, B, C be three mutually independent events. Consider the two statements $S_1 and S_2$ $S_1 : A and B \cup C$ are independent $S_2 : A and B \cap C$ are independent Then, a. both $S_1 and S_2$ are true b. only S_1 is true c. only S_2 is true d. neither $S_1 n$ or S_2 is true

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316. A box contains 24 identical balls of which 12 are white and 12 are black. The balls are drawn at random from the box one at a time with replacement. The probability that a white ball is drawn for the 4th time on the 7th draw is (a) $\frac{5}{64}$ (b) $\frac{27}{32}$ (c) $\frac{5}{32}$ (d) $\frac{1}{2}$

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317. In a certain town, 40% of the people have brown hair, 25% have brown eyes, and 15% have both brown hair and brown eyes. If a person selected at random from the town has brown hair, the probability that he also has brown eyes is $1/5$ b. $3/8$ c. $1/3$ d. $2/3$

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318. If $\bar{E}$ and $\bar{F}$ are the complementary events of events E and F, respectively, and if $0 < P(F) < 1$, then a.$P\left(\frac{E}{F}\right) + P\left(\frac{\bar{E}}{F}\right) = 1$ b.

$P\left(\frac{E}{F}\right) + P\left(\frac{E}{\bar{F}}\right) = 1$ c. $P\left(\frac{\bar{E}}{F}\right) + P\left(\frac{E}{\bar{F}}\right) = 1$ d. $P\left(\frac{E}{\bar{F}}\right) + P\left(\frac{\bar{E}}{\bar{F}}\right) = 1$

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319. The probability that a bulb produced by a factory will fuse after 150 days if used is 0.05. what is the probability that out of 5 such bulbs none will fuse after 150 days of use? a.$1 - \left(\frac{19}{20}\right)^5$ b. $\left(\frac{19}{20}\right)^5$ c. $\left(\frac{3}{4}\right)^5$ d. $90\left(\frac{1}{4}\right)^5$

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320. A coin is tossed $2n$ times. The chance that the number of times one gets head is not equal to the number of times one gets tails is $\frac{(2n!)}{(n!)^2}\left(\frac{1}{2}\right)^{2n}$ b. $1 - \frac{(2n!)}{(n!)^2}$ c. $1 - \frac{(2n!)}{(n!)^2}\frac{1}{\left(4^n\right)}$ d. none of these

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321. Sixteen players $S_1, S_2, ..., S_{16}$ play in a tournament. They are divided into eight pairs at random. From each pair a winner is decided on the basis of a game played between the two players of the pair. Assume that all the players are of equal strength.Find the probability that the player S_1 is among the eight winners.

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322. If p and q are chosen randomly from the set {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} with replacement then determine the probability that the roots of the equation $x^2 + px + q = 0$ are real.

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323. In a game a coin is tossed $2n + m$ times and a player wins if he does not get any two consecutive outcomes same for at least $2n$ times in a row.

The probability that player wins the game is a. $\frac{m+2}{2^{2n}+1}$ b. $\frac{2n+2}{2^{2n}}$ c. $\frac{2n+2}{2^{2n+1}}$

d. $\frac{m+2}{2^{2n}}$

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324. A letter is known to have come either from LONDON or CLIFTON. On the envelope just two consecutive letters ON are visible. What is the probability that the letter has come from (i) LONDON (ii) CLIFTON?

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325. It is tossed n times. Let P_n denote the probability that no two (or more) consecutive heads occur. Prove that $P_1 = 1, P_2 = 1 - p^2$ and $P_n = (1 - P)P_{n-1} + p(1 - P)P_{n-2}$ for all $n \le 3$.

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326. An urn contains m white and n black balls. A ball is drawn at random and is put back into the urn along with k balls of the same colour as that of the ball drawn. a ball is again drawn at random. Show that the probability of drawing a white ball now does not depend on k.

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327. An unbiased dice, with faces numbered 1,2,3,4,5,6, is thrown n times and the list of n numbers shown up is noted. Then find the probability that among the numbers 1,2,3,4,5,6 only three numbers appear in this list.

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328. The chance of an event happening is the square of the chance of a second event but the odds against the first are the cube of the odds against the second. The chances of the events are

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329. Two numbers are randomly selected and multiplied. Consider two events E_1 and E_2 defined as

E_1: Their product is divisible by 5

E_2: Unit's places in their product is 5

Which of the following statement is/are correct ?

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330. The probability that a 50 year old man will be alive at 60 is 0.83 and the probability that a 45 year old woman will be alive at 55 is 0.87. Then (a)The probability that both will be alive is 0.7221 (b)At least one of them will alive is 0.9779 (c)At least one of them will alive is 0.8230 (d)The probability that both will be alive is 0.6320

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Examples

1. A coin is toosed three times consider the following events. A:'No head appears', B: 'Exactly one head appears' and C: 'Atleast two heads appear'.

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2. Find the probability of getting more than 7 when two dice are rolled.

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3. A die is loaded so that the probability of a face i is proportional to $i, i = 1, 2, 6.$ Then find the probability of an even number occurring when the die in rolled.

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4. Consider the experiment of tossing a coin. If the coin shows head, toss it again but if it shows tail, then throw a die. Find the conditional probability of the event that the die shows a number greater than 4 given that there is atleast one tail.

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5. Four candidates A, B, C, D have applied for the assignment ot coach a school cricket team. If A is twice as likely to be selected as B, and B and C are given about the same chance of being selected, while C is twice as likely to be selected as D, what are the probability that (i) C will be selected ? (ii) A will not be selected?

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6. If $\frac{1+3p}{3}, \frac{1-p}{1}, \frac{1-2p}{2}$ are the probabilities of 3 mutually exclusive events then find the set of all values of p.

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7. A matrix is chosen at random from a set of all matrices of order 2 , with elements 0 or 1 only. The probability that the determinant of the matrix chosen is non-zero will be :

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8. A dice is rolled three times, find the probability of getting a larger number than the previous number each time.

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9. If a coin be tossed n times, then find the probability that the head comes odd times.

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10. A card is drawn at random from a pack of cards. What ist the probability that the drawn card is neither a heart nor a king?

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11. Card is drawn from a pack of 52 cards. A persons bets that it is a spade or an ace. What are the odds against him of winning this bet?

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12. A fair dice is thrown three times. If p, q and r are the numbers obtained on the dice, then find the probability that $i^p + i^q + i^r = 1$, where $I = \sqrt{-1}$.

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13. A mapping is select at random from the set of all the mappings of the set $A = \{1, 2, n\}$ into itself. Find the probability that the mapping selected is an injection.

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14. Two integers $xandy$ are chosen with replacement out of the set $\{0, 1, , 2, 3, 10\}$ Then find the probability that $|x - y| > 5$.

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15. Find the probability that the 3Ns come consecutively in the arrangement of the letters of the word CONSTANTINOPLE.

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16. Out of $3n$ consecutive integers, there are selected at random. Find the probability that their sum is divisible by 3.

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17. Find the probability that a randomly chosen three-digit number has exactly three factors.

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18. If $pandq$ are chosen randomly from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ with replacement, determine the probability that the roots of the equation $x^2 + px + q = 0$ are real.

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19. An integer is chosen at random and squared. Find the probability that the last digit of the square is 1 or 5.

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20. Four fair dices are thrown simultaneously. Find the probability that the highest number obtained is 4.

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21. An unbiased dice, with faces numbered 1, 2, 3, 4, 5, 6, is thrown n times and the list of n numbers shown up is noted. Then find the probability that among the numbers 1, 2, 3, 4, 5, 6 only three numbers appear in this list and each number appears at least once.

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22. Six points are there on a circle from which two triangles drawn with no vertex common. Find the probability that none of the sides of the triangles intersect.

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23. Balls are drawn one-by-one without replacement from a box containing 2 black, 4 white and 3 red balls till all the balls are drawn. Find the probability that the balls drawn are in the order 2 black, 4 white and 3 red.

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24. In how many ways, can three girls can three girls and nine boys be seated in two vans, each having numbered seats, 3 in the and 4 at the back? How many seating arrangements are possible if 3 girls should sit together in a back row on adjacent seats? Now, if all the seating arrangements are equally likely, what is the probability of 3 girls sitting together in a back row on adjacent seats?

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25. Find the probability that the birth days of six different persons will fall in exactly two calendar months.

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26. If ten objects are distributed at random among ten persons, then find the probability that at least one of them will not get any object.

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27. 2^n players of equal strength are playing a knock out tournament. If they are paired at randomly in all rounds, find out the probability that out of two particular players $S_1 and S_2$, exactly one will reach in semi-final $(n \in N, n \geq 2)^{\cdot}$

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28. Fourteen numbered balls (1, 2, 3, ..., 14) are divided in 3 groups randomly. Find the probability that the sum of the numbers on the balls, in each group, is odd.

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29. Five different digits from the set of numbers {1, 2, 3, 4, 5, 6, 7} are written in random order. Find the probability that five-digit number thus formed is divisible by 9.

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30. Three married couples sit in a row. Find the probability that no husband sits with his wife.

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31. A box contains 6 nails and 10 nuts. Half of the nails and half of the nuts are rusted. If one item is chosen at random, then find the probability that it is rusted or is a nail.

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32. The probability that atleast one of A and B occur is 0.6. If A and B occur simultaneously with probability 0.2, then find $P\left(\bar{A}\right) + P\left(\bar{B}\right)$.

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33. If $P(A \cup B) = 3/4 and P(A) = 2/3$, then find the value of $P(A \cap B)$

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34. Let A, B, C be three events. If the probability of occurring exactly one event out of $AandBis1 - x,$ out of$BandCis1 - 2x,$ out of$CandAis1 - x,$ and that of occuring three events simultaneously is x^2 , then prove that the probability that atleast one out of A, B, C will occur is greaer than 1/2 .

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35. Let A and B be any two events such that P(A) = $\frac{1}{2}$ and P(B) = $\frac{1}{3}$. Then find the value of $P(A' \cap B')' + P(A' \cup B')'$.

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36. If A and B are events such that $P(A' \cup B') = \frac{3}{4}, P(A' \cap B') = \frac{1}{4}$ and $P(A) = \frac{1}{3}$, then find the value of $P(A' \cap B)$

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37. A sample space consists of 9 elementary outcomes outcomes $E_1, E_2,...,$ E_9 whose probabilities are:

P(E_(1))=P(E_(2)) = 0.09, P(E_(3))=P(E_(4))=P(E_(5))=0.1P(E_(6)) = P(E_(7)) = 0.2, P(E_(8)) = P(E_(9)) = 0.06IfA = {E_(1), E_(5), E_(8)}, B= {E_(2), E_(5), E_(8), E_(9)} $then(a)Calc\underline{a}teP(A), P(B), \text{ and } P(A$nn $B\Big)$. $(b)Usingtheadditionlawofprobability, calc\underline{a}te$P(A uu B) . $(c)Listthecompositionoftheevent$A uu B, $\text{ and } calc\underline{a}te$P(A uu B) $byadd \in gtheprobabilitiesofthee \leq mentaryoutcomes. (d)Calc\underline{a}te$P(barB) $omP(B), alsocalc\underline{a}te$P(barB)` directly from the elementarty outcomes of B.

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38. The following Venn diagram shows three events, A, B, and C, and also the probabilities of the various intersections.

Determine

(a) P(A)

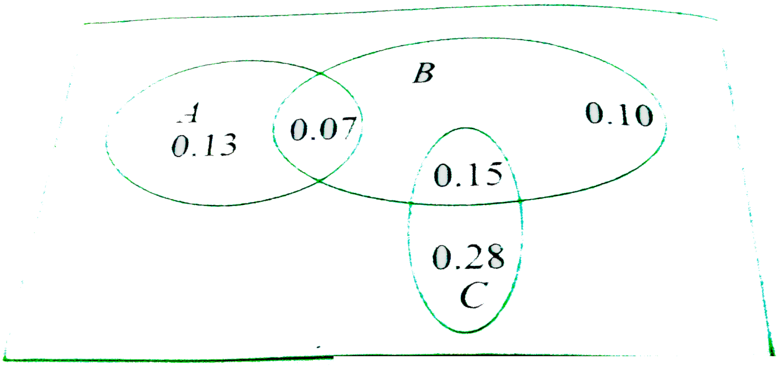
(b) $P\left(B \cap \bar{C}\right)$

(c) $P(A \cup B)$

(d) $P\left(A \cap \bar{B}\right)$

(e) $P(B \cap C)$

(f) Probability of the event that exactly one of A, B, and C occurs.



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39. Three numbers are chosen at random without replacement from {1,2,3,....10}. The probability that the minimum of the chosen number is 3 or their maximum is 7 , is:

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40. If A and B are two events such that P(A) = $\frac{1}{2}$ and P(B) = $\frac{2}{3}$, then show that

(a) $P(A \cup B) \geq \frac{2}{3}(b)\frac{1}{6} \leq P(A \cap B) \leq \frac{1}{2}$

(c) $P\left(A \cap \bar{B}\right) \leq \frac{1}{3}(d)\frac{1}{6} \leq P\left(\bar{A} \cap B\right) \leq \frac{1}{2}$

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41. Given two events $AandB$. If odds against A are as 2:1 and those in favour of $A \cup B$ are 3:1, then find the range of $P(B)$

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42. The probabilities of three events $A, B, andC$ are $P(A) = 0.6, P(B) = 0.4, andP(C) = 0.5.$ If $P(A \cup B) = 0.8, P(A \cap C) = 0.3, P(A \cap B \cap C) = 0.2, andP(A \cup B \cup C) \geq 0.85$ then find the range of $P(B \cup C)$

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43. Find $\vec{a}.\ \vec{b}$, When $\vec{a} = \hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = 3\hat{i} + 2\hat{j} + \hat{k}$

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44. The sum of two positive quantities is equal to $2n$ the probability that their product is not less than 3/4 times their greatest product is $3/4$ b. $1/4$ c. $1/2$ d. none of these

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45. Two natural numbers x and y are chosen at random. What is the probability that $x^2 + y^2$ is divisible by 5?

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46. If a fair coin is tossed 5 times, the porbability that heads does not occur two or more times in a row is

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47. Let P(x) denote the probability of the occurrence of event x. Plot all those point (x y) = (P(A), P(B)) in a plane which satisfy the conditions, $P(A \cup B) \geq 3/4$ and $1/8 \leq P(A \cap B) \leq 3/8$

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48. In a certain city only two newspapers A and B are published, it is known that 25% of the city population reads A and 20% reads B, while 8% reads both A and B. It is also known that 30% of those who read A but not B look int advertisements and 40% of those who read B bu not A look into advertisements while 50% of those who read both A and B look into advertisements What is the percentage of the population reads an advertisement? [1984]

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49. A box contains two 50 paise coins, five 25 paise coins and a certain fixed number $N(\geq 2)$ of 10 and 5-paise coins. Five coins are taken out of the box at random. Find the probability that the total value of these 5 coins is less than 1 rupee and 50 paise.

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50. Eight players $P_1, P_2, P_3, \ldots\ldots\ldots. P_8$, play a knock out tournament. It is known that whenever the players P_i and P_j, play, the player P_i will win if $i < j$. Assuming that the players are paired at random in each round, what is the probability that the players P_4, reaches the final ?

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51. Two dice are thrown. What is the probability that the sum of the numbers appearing on the two dice is 11, it 5 appears on the first?

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52. If P(A) = 0.8, P(B) = 0.5 and P (B|A) = 0.4, find

(i) $P(A \cap B)$ (ii) P(A|B) (iii) $P(A \cup B)$

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53. If two events A and B are such that $P\left(A^l\right) = 0.3$, $P(B) = 0.4$ and $P\left(A \cap B^l\right) = 0.5$, then $P\left(\frac{B}{A \cup B^l}\right)$ equals

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54. Determine P(E|F)

A coin is tossed three times, where

(i) E : head on third toss , F : heads on first two tosses

(ii) E : at least two heads , F : at most two heads

(iii) E : at most two tails F : at least one tail

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55. A die is thrown three times and the sum of the 3 numbers shown is 15. The probability that the first throw was a four, is

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56. Assume that each born child is equally likely to be a boy or a girl. If a family has two childeren what is the conditional probability that both gives both are girls given that

i. the youngest is a girl

ii. Atleast one is a girl

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57. Evaluate $\int \frac{x^2 - 1}{x^4 + 1} dx$

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58. A box contains 10 mangoes out of which 4 are rotten. Two mangoes are taken out together. If one of them is found to be good, then find the probability that the other is also good.

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59. An urn contains 10 black and 5 white balls. Two balls are drawn from the run one after the other without replacement. What is the probability that first ball is black and second ball is black and second ball is white ?

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60. Three cards are drawn successively, without replacement from a pack of 52 well shuffied cards. What is the probability that first, second and third cards are jack, queen and kind, respectively ?

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61. One of the ten available keys opens the door. If we try the keys one after another, then find the following

(i) the probability that the door is opened in the first attemt.

(ii) the probability tht the door is opened in the second attempt.

(iii) the probability that the door is opened in the third attempt.

(iv) the probability that the door is opened in the tenth attempt.

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62. A bag contains 10 white and 3 black balls. Balls are drawn one by one without replacement till all the black balls are drawn. Then find the probability that this procedure for drawing the balls will come to an end at the rth draw.

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63. A fair coin is tossed repeatedly. If tail appears on first four tosses, then find the probability of head appearing on fifth toss.

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64. If $P(A/B) = P(A/B')$, then prove that $AandB$ are independent.

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65. A die marked 1, 2, 3 in red and 4, 5, 6 in green is tossed. Let A be the event, 'the number is even,' and B be the event, 'the number is red'. Are A and B independent?

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66. Three persons work independently on a problem. If the respective probabilities that they will solve it are 1/3, 1/4 and 1/5, then find the probability that not can solve it.

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67. The probability of hitting a target by three marksmen are 1/2, 1/3 and 1/4. Then find the probabi9lity that one and only one of them will hit the target when they fire simultaneously.

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68. An electrical system has open-closed switches $S_1, S_2 and S_3$ as shown in fig. The switches operate independently of one another and the current will flow from $A \rightarrow B$ either if S_1 is closed or if both $S_2 and S_3$ are closed. If $P(S_1) = P(S_2) = P(S_3) = 1/2,$ then find the probability that the circuit will work. fig

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70. If four whole numbers taken art random are multiplied together, then find the probability that the last digit in the product is 1,3,7, or 9.

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71. If A and B are two independent events, the probability that both A and B occur is 1/8 are the probability that neither of them occours is 3/8. Find the probaility of the occurrence of A.

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72. The unbiased dice is tossed until a number greater than 4 appear. What is the probability that an even number of tosses is needed?

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73. A pair of unbiased dice are rolled together till a sum of either 5 or 7 is obtained. Then find the probability that 5 comes before 7.

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74. An unbiased normal coin is tossed n times. Let

E_1: event that both heads and tails are present in n tosses.

E_2: event that the coin shows up heads at most once.

The value of n for which E_1 and E_2 are independent is _____.

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75. X speaks truth in 60% and Y in 50% of the cases. Find the probability that they contradict each other narrating the same incident.

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76. A person has undertaken a construction job. The probabilities are 0.80 that there will be a strike, 0.70 that the construction job will be completed on time if there is no strike, and 0.4 that the construction job will be completed on time if there is a strike. Determine the probability that the construction job will be completed on time.

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77. A bag contains $n+1$ coins. If is known that one of these coins shows heads on both sides, whereas the other coins are fair. One coin is selected at random and tossed. If the probability that toss results in heads is 7/12, then find the value of $\dot{n}$

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78. find $fogoh$ If the funtion $f(x) = x - 1$ and $g(x) = 2x - 3, h(x) = 4x.$

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79. Urn A contains 6 red and 4 black balls and urn B contains 4 red and 6 black balls. One ball is drawn at random from urn A and placed in urn B. Then, one ball is drawn at random from urn B and placed in urn A. If one ball is drawn at random from urn A, the probability that it is found to be red, is....

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80. An urn contains 6 white and 4 black balls. A fair die is rolled and that number of balls we chosen from the urn. Find the probability that the balls selected are white.

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81. Suppose families always have one, two, or three children, with probabilities 1/4, 1/2, and 1/4, respectively. Assume everyone eventually gets married and has children, then find the probability of a couple having exactly four grandchildren.

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82. On a normal standard dic one of the 21 dots from any one of the six faccs is removéd at random with each dot equally likely to be chosen. The die is then rolled. The probability that the top face has an odd number of dots is

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83. Find k if $fog = gof$ where $f(x) = 4x + 8, g(x) = 3x + k$.

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84. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and

0.15 respectively. One of the insured persons meets with an accident. What is the probability that he i

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85. A laboratory blood test is 99% effective in detecting a certain disease when it is in fact, present. However, the test also yields a false positive result for 0.5% of the healthy person tested (i.e. if a healthy person is tested, then, with probability 0.005, the test will imply he has the disease). If 0.1 percent of the population actually has the disease, what is the probability that a person has the disease given that his test result is positive ?

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86. In an entrance test, there are multiple choice questions. There are four possible answers to each question, of which one is correct. The probability that a student knows the answer to a question is 90%. If the gets the correct answer to a question, then find the probability that he was guessing.

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87. Each of the n urns contains 4 white and 6 black balls. The $(n+1)$ th urn contains 5 white and 5 black balls. One of the $n+1$ urns is chosen at random and two balls are drawn from it without replacement. Both the balls turn out to be black. If the probability that the $(n+1)$ th urn was chosen to draw the balls is 1/16, then find the value of n .

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88. Die A has 4 red and 2 white faces, whereas die B has 2 red and 4 white faces. A coins is flipped once. If it shows a head, the game continues by throwing die A: if it shows tail, then die B is to be used. If the probability that die A is used is 32/33 when it is given that red turns up every time in first n throws, then find the value of n .

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89. A bag contain n ball out of which some balls are white. If probability that a bag contains exactly i white ball is pro0portional to i^{3}. A ball is drawn at random from the bag and found to be white, then find the probability that bag contains exactly 2 white balls.

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90. A die is thrown 7 times. What is the chance that an odd number turns up (i) exactly 4 times (ii) at least 4 times

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91. Suppose that 90% of people are right- handed. What is the probability that atmost 6 of a random sample of 10 people are right- handed?

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92. An experiment succeeds twice as often as it fails. Find the probability that in the next six trials, there will be atleast 4 successes.

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93. What is the probability of guessing correctly at least 8 out of 10 answer on true-false examination?

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94. A rifleman is firing at a distant target ansd hence, has only 10% chances of hitting it. Find the number of rounds, he must fire in order to have more than 50% chances of hitting it at least once.

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95. $A and B$ play a series of games which cannot be drawn and p, q are their respective chance of winning a single game. What is the chance that A wins m games before B wins n games?

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96. Eight players $P_1, P_2, \ldots, P_8$ play a knock-out tournament. It is known that whenever the players P_i and P_j play, the player P_i will win if $i < j$. Assuming that the players are paired at random in each round, what is the probability that the player P_4 reaches the final?

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97. Suppose A and B shoot independently until each hits his target. They have probabilities $\frac{3}{5}$ and $\frac{5}{7}$ of hitting the target at each shot. The probability that B will require more shots than A is

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98. A tennis match of best of 5 sets is played by two players A and B. The probability that first set is won by A is 1/2 and if he losed the first, then probability of his winning the next set is 1/4, otherwise it remains same. Find the probability that A wins the match.

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101. For a student to qualify, he must pass at least two out of three exams. The probability that he will pass the 1st exam is p. If he fails in one of the exams, then the probability of his passing in the next exam, is p/2 otherwise it remains the same.Find the probability that he will qualify.

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102. If A and B are two independent events, prove that $P(A \cup B). P(A' \cap B') \leq P(C)$, where C is an event defined that exactly one of A and B occurs.

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103. Two players P_1, and P_2, are playing the final of a chase championship, which consists of a series of match Probability of P_1, winning a match is 2/3 and that of P_2 is 1/3. The winner will be the one who is ahead by 2 games as compared to the other player and wins at least 6 games. Now, if the player P_2, wins the first four matches find the probability of P_1, wining the championship.

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104. Consider a game played by 10 prople in which each flips a fair coin at the same time. If all but one of the coins comes up the same, then the add persons wing (e.g., if there are nine tails and one head then person having lead wins.) If such a situation does not occur, the players flips again. Find the probability that game is settled on or after nth toss.

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105. A coin is tossed (m+n) times with m>n. Show that the probability of getting m consecutive heads is $\frac{n+2}{2^{m+1}}$

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106. Sixteen players $S_1, S_2, \ldots, S_{16}$ play in a tournament. They are divided into eight pairs at random. From each pair a winner is decided on the basis of a game played between the two players decided to the basis of a game played between the two players of the pair. Assume that all the players are of equal strength.

(a) Find the prabability that the player S_1 is among the eight winners.

(b) Find the probability that exactly one of the two players S_1 and S_2 is among the eight winners.

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107. An urn contains 2 white and 2 black balls .A ball is drawn at random.If it is white ,it is not replace into urn ,otherwise it is replaced along with another ball of the same colour .the process is repeated , then find the probabiltiy that the third ball drawn is black.

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108. An unbiased coin is tossed. If the outcome is a head, then a pair of unbiased dice is rolled and the sum of the number obtained on them is noted. If the toss of the coin results in tail, then a card from a well-shuffled pack of nine cards numbered 1, 2, 3, ..., 9 is randomly picked and the number on the card is noted. The probability that the noted number is either 7 or 8 is

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109. m balls are distributed among a boys and b girls. Prove that the probability that odd numbers of balls are distributed to boys is $\frac{(b+a)^m - (b+a)^m}{2(a+b)^m}$.

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110. A man takes a step forward with probability 0.4 and backward with probability 0.6. Find the probability that at the end of 11 steps, he is one step away from the starting point.

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111. From an urn containing a white b black balls, k balls are drawn and laid aside, their colour unnoted. Then one more ball is drawn. Find the probability that it is white assuming that $k < a, b$.

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112. A bag contains n balls, one of which is white. The probability that A and B speak truth are P_1 and P_2, respectively. One ball is drwn from the bag and A and B both assert that it is white. Find the probability that drawn ball is actually white.

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113. A bag contains a total of 20 books on physics and mathematics, Any possible combination of books is equally likely. Ten books are chosen from the bag and it is found that it contains 6 books of mathematics. Find out the probability that the remaining books in the bag contains 3 books on mathematics.

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114. In a competitive examination, an examinee either guesses or copies or knows the answer to amultiple choice question with four choices. The probability that he makes a guess is $\frac{1}{3}$ and the probability that he copies the answer is 1/6. The probability that the answer is correct, given that he copiedit, is $\frac{1}{8}$. Find the probability that he knows the answer to the question, given that he correctly answered

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115. A box contains N coins m of which are fair and the rest are biased. The probability of getting a head when a fair coin is tossed is 1/2, while it is 2/3 when a biased coin is tossed. A coin is drawn from the box at random and is tossed twice. The first time it shows head and the second time it shows tail. What is the probability that the coin drawn is fair?

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116. A person goes to office either by car, scooter, bus or train probability of which being $\frac{1}{7}, \frac{3}{7}, \frac{2}{7}$ and $\frac{1}{7}$ respectively. Probability that he reaches office late, if he takes car, scooter, bus or train is $\frac{2}{9}, \frac{1}{9}, \frac{4}{9}$ and $\frac{1}{9}$ respectively. Given that he reached office in time, then what is the probability that he travelled by a car?

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Solved Example

1. There are two bags each containing 10 books all having different titles but of the same size. A student draws out books from the first bag as well as from the second bag. Find the probability that the different between the books drawn from the two bags does not exceed 2.

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Exercise 9.1

1. Which of the following cannot be valid assignment of probabilities for outcomes of sample space $S = \{W_1, W_2, W_3, W_4, W_5, W_6, W_7\}$

Assignment	W_1	W_2	W_3	W_4	W_5	W_6	W_7
(a)	0.1	0.01	0.05	0.03	0.01	0.2	0.6
(b)	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$
(c)	0.1	0.2	0.3	0.4	0.5	0.6	0.7
(d)	−0.1	0.2	0.3	0.4	−0.2	0.1	0.3
(e)	$\frac{1}{14}$	$\frac{2}{14}$	$\frac{3}{14}$	$\frac{4}{14}$	$\frac{5}{14}$	$\frac{6}{14}$	$\frac{15}{14}$

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2. Consider the following assignments of probabilities for outcomes of sample space S = {1, 2, 3, 4, 5, 6, 7, 8}.

Number (X)	1	2	3	4	5	6	7	8
Probability, P(X)	0.15	0.23	0.12	0.10	0.20	0.08	0.07	0.05

Find the probability that

X is a prime number

(b) X is a number greater than 4.

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3. The probability that a leap year will have 53 Fridays or 53 Saturdays is ....

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4. A dice is loaded so that the probability of a face I is proportional to i^2, I = 1, 2, ..., 6. Then find the probability of occurring a prime number when the dice is rolled.

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5. Find the probability of drawing either an ace or a king from a pack of card in a single draw.

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6. Three faces of a fair dice are yellow, two are red and one is blue. Find the probability that the dice shows (a) yellow, (b) red and (c) blue face.

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Exercise 9.2

1. If two fair dices are thrown and digits on dices are a and b, then find the probability for which $\omega^{ab} = 1$, (where ω is a cube root of unity).

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2. There are n letters and n addressed envelopes. Find the probability that all the letters are not kept in the right envelope.

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3. Find the probability of getting total of 5 or 6 in a single throw of two dice.

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4. Two integers are chosen at random and multiplied. Find the probability that the product is an even integer.

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5. If out of 20 consecutive whole numbers two are chosen at random, then find the probability that their sum is odd.

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6. A bag contains 3 red, 7 white, and 4 black balls. If three balls are drawn from the bag, then find the probability that all of them are of the same color.

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7. An ordinary cube has 4 blank faces, one face mark 2 and another marked 3, then the probability of obtaining 12 in 5 throws is

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8. If the letters of the word REGULATIONS be arranged at random, find the probability that there will be exactly four letters between the R and the E.

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9. A five-digit number is formed by the digit 1, 2, 3, 4, 5 without repetition. Find the probability that the number formed is divisible by 4.

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10. Five persons entered the lift cabin on the ground floor of an 8-floor house. Suppose that each of them independently and with equal probability can leave the cabin at any floor beginning with the first. Find out the probability of all five persons leaving at different floors.

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11. Two friends $AandB$ have equal number of daughters. There are three cinema tickets which are to be distributed among the daughters of $AandB$. The probability that all the tickets go to the daughters of A is 1/20. Find the number of daughters each of them have.

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12. A bag contains 12 pairs of socks. Four socks are picked up at random. Find the probability that there is at least one pair.

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13. There are eight girls among whom two are sisters, all of them are t sit on a round table. Find the probability that the two sisters do not sit together.

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14. A bag contains 50 tickets numbered 1, 2, 3, .., 50 of which five are drawn at random and arranged in ascending order of magnitude `(x_1

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15. A pack of 52 cards is divided at random into two equals parts. Find the probability that both parts will have an equal number of black and red cards.

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16. Let the nine different letters $A, B, C \ldots I \in \{1, 2, 3, \ldots, 9\}$. Then find the probability that product $(A - 1)(B - 1)\ldots(I - 9)$ is an even number.

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17. If two distinct numbers m and n are chosen at random form the set {1, 2, 3, ..., 100}, then find the probability that $2^m + 2^n + 1$ is divisible by 3.

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18. Two number $aandb$ aer chosen at random from the set of first 30 natural numbers. Find the probability that $a^2 - b^2$ is divisible by 3.

Watch Video Solution

19. Twelve balls are distribute among three boxes. The probability that the first box contains three balls is a. $\frac{110}{9}\left(\frac{2}{3}\right)^{10}$ b. $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$ c. $\frac{(12)C_3}{12^3} \times 2^9$ d.

$$\frac{(12)C_3}{3^{12}}$$

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Exercise 9.3

1. $AandB$ are two candidates seeking admission in ITT. The probability that A is selected is 0.5 and the probability that $AandB$ are selected is at most 0.3. Is it possible that the probability of B getting selected is 0.9?

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2. If A and B are events such that $P(A \cup B) = (3)/(4), P(A \cap B) = (1)/(4)$ and $P\left(A^c\right) = (2)/(3)$, then find

(a) P(A) (b) P(B)

(c) $P\left(A \cap B^c\right)(d)P\left(A^c \cap B\right)$

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3. If $P(A \cap B) = \frac{1}{2}, P(A \cap B) = \frac{1}{3}, P(A) = p, P(B) = 2p,$ then find the value of p.

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4. In a class of 125 students 70 passed in Mathematics, 55 in statistics, and 30 in both. Then find the probability that a student selected at random from the class has passes in only one subject.

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5. In a certain population, 10% of the people are rich, 5% are famous, and 3% are rich and famous. Then find the probability that a person picked at random from the population is either famous or rich but not both.

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6. Three students $AandBandC$ are in a swimming race. $AandB$ have the same probability of winning and each is twice as likely to win as C. Find the probability that the B or C wins. Assume no two reach the winning point simultaneously.

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7. Let A, B, C be three events such that $P(A) = 0.3, P(B) = 0.4, P(C) = 0.8, P(A \cap B) = 0.88, P(A \cap C) = 0.28, P(A \cap B$

If $P(A \cup B \cup C) \geq 0.75,$ then show that $0.23 \leq P(B \cap C) \leq 0.48.$

Watch Video Solution

Exercise (Single)

1. A sample space consists of 3 sample points with associated probabilities given as $2p, p^2, 4p - 1.$ Then the value of p is

A. $p = \sqrt{11} - 3$

B. $\sqrt{10} - 3$

C. $\frac{1}{4} < p < \frac{1}{2}$

D. none of these

Answer: A

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2. Let E be an event which is neither a certainty nor an impossibility. If probability is such that $P(E) = 1 + \lambda + \lambda^2$ and $P\left(E'\right) = (1 + \lambda)^2$ in terms of an unknown $\dot{\lambda}$ Then $P(E)$ is equal to

A. 1

B. $\frac{3}{4}$

C. $\frac{1}{4}$

D. none of these

Answer: B

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3. Three balls marked with 1, 2 and 3 are placed in an urn. One ball is drawn, its number is noted, then the ball is returned to the urn. This process is repeated and then repeated once more. Each ball is equally likely to be drawn on each occasion. If the sum of the number noted is 6, then the probability that the ball numbered with 2 is drawn at all the three occassion, is

A. $\frac{1}{27}$

B. $\frac{1}{7}$

C. $\frac{1}{6}$

D. $\frac{1}{3}$

Answer: B

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4. A draws a card from a pack of n cards marked $1, 2, \ldots, n$ The card is replaced in the pack and B draws a card. Then the probability that A draws a higher card than B is a. $(n + 1)2n$ b. $1/2$ c. $(n - 1)2n$ d. none of these

A. $(n + 1)/2n$

B. $1/2$

C. $(n - 1)/2n$

D. none of these

Answer: C

Watch Video Solution

5. South African cricket captain lost toss of a coin 13 times out of 14. The chance of this happening was $7/2^{13}$ b. $1/2^{13}$ c. $13/2^{14}$ d. none

A. $7/2^{13}$

B. $1/2^{13}$

C. $13/2^{14}$

D. $13/2^{13}$

Answer: A

Watch Video Solution

6. The probability that in a family of 5 members, exactly two members have birthday on sunday is:-

A. $\frac{12 \times 5^3}{7^5}$

B. $\frac{10 \times 6^2}{7^5}$

C. $\frac{2}{5}$

D. $\frac{10 \times 6^3}{7^5}$

Answer: D

Watch Video Solution

7. Three houses are available in a locality. Three persons apply for the houses. Each applies for one houses without consulting others. The probability that all three apply for the same houses is a. $1/9$ b. $2/9$ c. $7/9$ d. $8/9$

A. $1/9$

B. $2/9$

C. $7/9$

D. $8/9$

Answer: A

Watch Video Solution

8. The numbers 1, 2, 3, ..., n are arrange in a random order. The probability that the digits 1, 2, 3, .., $k(k < n)$ appear as neighbours in that order is (a)

$1n!$ (b)$k!/n!$ (c) $(n - k)!/n!$ (d)$(n - k + 1)!/n!$

A. $1/n!$

B. $k!/n!$

C. $(n - k)!/n!$

D. $(n - k + 1)!/n!$

Answer: D

Watch Video Solution

9. Words from the letters of the word PROBABILITY are formed by taking all letters at a time. The probability that both $B's$ are not together and both $I's$ are not together is $52/55$ b. $53/55$ c. $54/55$ d. none of these

A. $52/55$

B. $53/55$

C. $54/55$

D. none of these

Answer: B

Watch Video Solution

10. There are only two women among 20 persons taking part in a pleasure trip. The 20 persons are divided into two groups, each group consisting of 10 person. Then the probability that the two women will be in the same group is $9/19$ b. $9/38$ c. $9/35$ d. none

A. $9/19$

B. $9/38$

C. $9/35$

D. none of these

Answer: A

Watch Video Solution

11. Five different games are to be distributed among 4 children randomly. The probability that each child get at least one game is 1/4 b. 15/64 c. 5/9 d. 7/12

A. 1/4

B. 15/64

C. 21/64

D. none of these

Answer: B

Watch Video Solution

12. A drawer contains 5 brown socks and 4 blue socks well mixed a man reaches the drawer and pulls out socks at random. What is the probability that they match? 4/9 b. 5/8 c. 5/9 d. 7/12

A. 4/9

B. $5/8$

C. $5/9$

D. $7/12$

Answer: A

Watch Video Solution

13. A four figure number is formed of the figures 1, 2, 3, 5 with no repetitions. The probability that the number is divisible by 5 is a.$3/4$ b. $1/4$ c. $1/8$ d. none of these

A. $3/4$

B. $1/4$

C. $1/8$

D. none of these

Answer: B

Watch Video Solution

14. Twelve balls are distribute among three boxes. The probability that the first box contains three balls is a. $\frac{110}{9}\left(\frac{2}{3}\right)^{10}$ b. $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$ c. $\frac{(12)C_3}{12^3} \times 2^9$ d. $\frac{(12)C_3}{3^{12}}$

A. $\frac{110}{9}\left(\frac{2}{3}\right)^{10}$

B. $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$

C. $\frac{.^{12}C_3}{12^3} \times 2^9$

D. $\frac{.^{12}C_3}{3^{12}}$

Answer: A

Watch Video Solution

15. A cricket club has 15 members, of whom only 5 can bowl . What is the probability that in a team of 11 members at least 3 bowlers are selected?

A. 7/13

B. 6/13

C. 11/15

D. 12/13

Answer: D

Watch Video Solution

16. Seven girls $G_1, G_2, G_3, \ldots, G_7$ are such that their ages are in order $G_1 < G_2 < G_3 < \ldots < G_7$. Five girls are selected at random and arranged in increasing order of their ages. The probability that G_5 and G_7 are not consecutive is

A. $\frac{20}{21}$

B. $\frac{19}{21}$

C. $\frac{17}{21}$

D. $\frac{13}{21}$

Answer: C

Watch Video Solution

17. A local post office is to send M telegrams which are distributed at random over N communication channels, $(N > M)$. Each telegram is sent over any channel with equal probability. Chance that not more than one telegram will be sent over each channel is:

A. $\frac{.^{N}C_{M} \times N!}{M^{N}}$

B. $\frac{.^{N}C_{M} \times M!}{N^{M}}$

C. $1 - \frac{.^{N}C_{M} \times M!}{M^{N}}$

D. $1 - \frac{.^{N}C_{M} \times N!}{N^{M}}$

Answer: B

Watch Video Solution

18. Dialling a telephone number an old man forgets the last two digits remembering only that these are different dialled at random. The probability that the number is dialled correctly is $1/45$ b. $1/90$ c. $1/100$ d. none of these

A. $1/45$

B. $1/90$

C. $1/100$

D. none of these

Answer: B

Watch Video Solution

19. $AandB$ toss a fair coin each simultaneously 50 times. The probability that both of them will not get tail at the same toss is $(3/4)^{50}$ b. $(2/7)^{50}$ c. $(1/8)^{50}$ d. $(7/8)^{50}$

A. $(3/4)^{50}$

B. $(2/7)^{50}$

C. $(1/8)^{50}$

D. $(7/8)^{50}$

Answer: A

Watch Video Solution

20. In a game called odd man out $m(m > 2)$ persons toss a coin to determine who will but refreshments for the entire group. A person who gets an outcome different from that of the rest of the members of the group is called the odd man out. The probability that there is a loser in any game is $1/2m$ b. $m/2^{m-1}$ c. $2/m$ d. none of these

A. $1/2m$

B. $m/2^{m-1}$

C. $2/m$

D. none of these

Answer: B

Watch Video Solution

21. $2n$ boys are randomly divided into two subgroups containint n boys each. The probability that eh two tallest boys are in different groups is $n/(2n-1)$ b. $(n-1)/(2n-1)$ c. $(n-1)/4n^2$ d. none of these

A. $n/(2n-1)$

B. $(n-1)(2n-1)$

C. $(n-1)/4n^2$

D. none of these

Answer: A

Watch Video Solution

22. If the papers of 4 students can be checked by any one of the 7 teachers, then the probability that all the 4 papers are checked by exactly 2 teachers is $2/7$ b. $12/49$ c. $32/343$ d. none of these

A. $2/7$

B. $12/49$

C. $32/343$

D. $6/49$

Answer: D

Watch Video Solution

23. If the events A and B are mutually exclusive events such that P(A) = $\frac{3x+1}{3}$ and P(B) = $\frac{1-x}{4}$, then the set of possible real values of x lies in the interval

A. [0, 1]

B. $\left[-\frac{1}{3}, \frac{5}{9}\right]$

C. $\left[-\frac{7}{9}, \frac{4}{9}\right]$

D. $\left[\frac{1}{3}, \frac{2}{3}\right]$

Answer: B

Watch Video Solution

24. A natural number is chosen at random from the first 100 natural numbers. The probability that $x + \frac{100}{x} > 50$ is $1/10$ b. $11/50$ c. $11/20$ d. none of these

A. $1/10$

B. $\frac{11}{50}$

C. $\frac{11}{20}$

D. none of these

Answer: C

Watch Video Solution

25. A dice is thrown six times, it being known that each time a different digit is shown. The probability that a sum of 12 will b e obtained in the first three throws is $5/24$ b. $25/216$ c. $3/20$ d. $1/12$

A. $\frac{5}{24}$

B. $\frac{25}{216}$

C. $\frac{3}{20}$

D. $\frac{1}{12}$

Answer: C

Watch Video Solution

26. If a is an integer lying in $[-5, 30]$, then the probability that the probability the graph of $y = x^2 + 2(a+4)x - 5a + 64$ is strictly above the x-axis is

A. $\frac{1}{6}$

B. $\frac{7}{36}$

C. $\frac{2}{9}$

D. $\frac{3}{5}$

Answer: C

Watch Video Solution

27. Four die are thrown simultaneously. The probability that 4 and 3 appear on two of the die given that 5 and 6 have appeared on other two die is

A. $\frac{1}{6}$

B. $\frac{1}{36}$

C. $\frac{12}{151}$

D. none of these

Answer: C

Watch Video Solution

28. A $2n$ digit number starts with 2 and all its digits are prime, then the probability that the sum of all 2 consecutive digits of the number is prime is

A. 4×2^{-3n}

B. 4×2^{-3n}

C. 2^{-3n}

D. none of these

Answer: B

Watch Video Solution

29. In a n - sided regular polygon, the probability that the two diagonal chosen at random will intersect inside the polygon is $\dfrac{2^{n}C_2}{\wedge\left(\wedge\left(nC_{2-n}\right)\right)C_2}$

b. $\dfrac{\wedge(n(n-1))C_2}{\wedge\left(\wedge\left(nC_{2-n}\right)\right)C_2}$ c. $\dfrac{\wedge nC_4}{\wedge\left(\wedge\left(nC_{2-n}\right)\right)C_2}$ d. none of these

A. $\dfrac{2^{n}C_2}{.\left(.^{n}C_{2-n}\right)C_2}$

B. $\dfrac{.^{n(n-1)}C_2}{.\left(.^{n}C_2-n\right)C_2}$

C. $\dfrac{.^{n}C_4}{.\left(.^{n}C_2-n\right)C_2}$

D. none of these

Answer: C

Watch Video Solution

30. A three-digit number is selected at random from the set of all three-digit numbers. The probability that the number selected has all the three digits same is $1/9$ b. $1/10$ c. $1/50$ d. $1/100$

A. $1/9$

B. $1/10$

C. $1/50$

D. $1/100$

Answer: D

Watch Video Solution

31. Two numbers a, b are chosen from the set of integers 1, ,2 3, ..., 39. Then probability that he equation $7a - 9b = 0$ is satisfied is $1/247$ b. $2/247$ c. $4/741$ d. $5/741$

A. $1/247$

B. $2/247$

C. $4/741$

D. $5/741$

Answer: C

Watch Video Solution

32. One mapping is selected at random from all mappings of the set $S = \{1, 2, 3, n\}$ into itself. If the probability that the mapping is one-one is $\frac{3}{32}$, then the value of n

A. 2

B. 3

C. 4

D. none of these

Answer: C

Watch Video Solution

33. A composite number is selected at random from the first 30 natural numbers and it is divided by 5. The probability that there will be remainder is $14/19$ b. $5/19$ c. $5/6$ d. $7/15$

A. $14/19$

B. $5/19$

C. $5/6$

D. $7/15$

Answer: A

Watch Video Solution

34. Forty team play a tournament. Each team plays every other team just once. Each game results in a win for one team. If each team has a 50% chance of winning each game, the probability that he end of the tournament, every team has won a different number of games is $1/780$ b. $40!/2^{780}$ c. $40!/2^{780}$ d. none of these

A. $1/780$

B. $40!/2^{780}$

C. $36/.^{64}C_3$

D. $98/.^{64}C_3$

Answer: B

Watch Video Solution

35. If three square are selected at random from chess board. then the probability that they form the letter 'L' is (a) $\frac{196}{64C_3}$ (b) $\frac{49}{64C_3}$ (c) $\frac{36}{64C_3}$ (d) $\frac{98}{64C_3}$

A. $196/.^{64}C_3$

B. $49/.^{64}C_3$

C. $36/.^{64}C_3$

D. $98/.^{64}C_3$

Answer: A

Watch Video Solution

36. A bag has 10 balls. Six ball are drawn in an attempt and replaced. Then another draw of 5 balls is made from the bag. The probability that exactly two balls are common to both the draw is $5/21$ b. $2/21$ c. $7/21$ d. $3/21$

A. $5/21$

B. $2/21$

C. $7/21$

D. $3/21$

Answer: A

Watch Video Solution

37. Find the probability that a randomly chosen three-digit number has exactly three factors.

A. $2/225$

B. $7/900$

C. $1/800$

D. none of these

Answer: B

Watch Video Solution

38. Let p,q be chosen one by one from the set $\{1, \sqrt{2}, \sqrt{3}, 2, e, \pi\}$ with replacement. Now a circle is drawn taking (p,q) as its centre. Then the probability that at the most two rational points exist on the circle is (rational points are those points whose both the coordinates are rational)

A. $2/3$

B. $7/8$

C. $8/9$

D. none of these

Answer: C

Watch Video Solution

39. Three integers are chosen at random from the set of first 20 natural numbers. The chance that their product is a multiple of 3 is $194/285$ b. $1/57$ c. $13/19$ d. $3/4$

A. $194/285$

B. $1/57$

C. $13/19$

D. $3/4$

Answer: A

Watch Video Solution

40. Five different marbles are placed in 5 different boxes randomly. Then the probability that exactly two boxes remain empty is (each box can hold any number of marbles) $2/5$ b. $12/25$ c. $3/5$ d. none of these

A. $2/5$

B. $12/25$

C. $3/5$

D. none of these

Answer: C

Watch Video Solution

41. There are 10 prizes, five As, there Bs and two Cs, placed in identical sealed envelopes for the top 10 contestants in a mathematics contest. The prizes are awarded by allowing winners to select an envelope at random from those remaining. Then the 8th contestant goes to select the prize, the probability that the remaining three prizes are once $AandB$ and one C is $1/4$ b. $1/3$ c. $1/12$ d. $1/10$

A. $1/4$

B. $1/3$

C. $1/12$

D. $1/10$

Answer: A

Watch Video Solution

42. A car is parked among N cars standing in a row, but not at either end. On his return, the owner finds that exactly r of the N places are still occupied. The probability that the places neighboring his car are empty is $\frac{(r-1)!}{(N-1)!}$ b. $\frac{(r-1)!(N-r)!}{(N-1)!}$ c. $\frac{(N-r)(N-r-1)}{(N-1)(N+2)}$ d. $\frac{\wedge (N-r)C_2}{\wedge (N-1)C_2}$

A. $\frac{(r-1)!}{(N-1)!}$

B. $\frac{(r-1)!(N-r)!}{(N-1)!}$

C. $\frac{(N-r)(N-r-1)}{(N+1)(N+2)}$

D. $\frac{.^{N-r}C_2}{.^{N-1}C_2}$

Answer: D

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43. A is a set containing n different elements. A subset P of A is chosen. The set A is reconstructed by replacing the elements of P. A subset Q of A is again chosen. The number of ways of choosing P and Q so that $P \cap Q$ contains exactly two elements is (a). $.^{n}C_3 \times 2^n$ (b). $.^{n}C_2 \times 3^{n-2}$ (c). 3^{n-1} (d). none of these

A. $\frac{3^{n-m}}{4^n}$

B. $\frac{.^nC_m.3^m}{4^n}$

C. $\frac{.^nC_m.3^{n-m}}{4^n}$

D. none of these

Answer: C

Watch Video Solution

44. Consider $f(x) = x^3 + ax^2 + bx + c$ Parameters a, b, c are chosen as the face value of a fair dice by throwing it three times Then the probability that $f(x)$ is an invertible function is (A) $\frac{5}{36}$ (B) $\frac{8}{36}$ (C) $\frac{4}{9}$ (D) $\frac{1}{3}$

A. $5/36$

B. $8/36$

C. $4/9$

D. $1/3$

Answer: C

Watch Video Solution

45. If a and b are chosen randomly from the set consisting of number 1, 2, 3, 4, 5, 6 with replacement. Then the probability that $\lim_{x \to 0}\left[\left(a^x + b^x\right)/2\right]^{2/x} = 6$ is

A. $1/3$

B. $1/4$

C. $1/9$

D. $2/9$

Answer: C

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46. Mr. A lives at origin on the Cartesian plane and has his office at $(4, 5)$. His friend lives at $(2, 3)$ on the same plane. Mrs. A can go to his office travelling one block at a time either in the $+y$ or $+x$ idrectin. If all possible paths are equally likely then the probability that Mr. A passed his friends house is (shortest path for any event must be consider4ed) $1/2$ b. $10/21$ c. $1/4$ d. $11/21$

A. $1/2$

B. $10/21$

C. $1/4$

D. $11/21$

Answer: B

Watch Video Solution

47. A man has 3 pairs of black socks and 2 pair of brown socks kept together in a box. If he dressed hurriedly in the dark, the probability that after he has put on a black sock, he will then put on another black sock is $1/3$ b. $2/3$ c. $3/5$ d. $2/15$

A. $1/3$

B. $2/3$

C. $3/5$

D. $2/15$

Answer: A

Watch Video Solution

48. There are 20 cards. Ten of these cards have the letter I printed on them and the other 10 have the letter I printed on them. If three cards picked up at random and kept in the same order, the probability of making word IIT is $1/9, 1/3$ b. $1/16, 1/4$ c. $1/4, 1/2$ d. none of these

A. $4/27$

B. $5/38$

C. $1/8$

D. $9/80$

Answer: B

Watch Video Solution

49. One ticket is selected at random from 100 tickets numbered 00,01,02,...,98,99. If $x_1, and x_2$ denotes the sum and product of the digits on the tickets, then $P\left(x_1 = 9/x_2 = 0\right)$ is equal to a.$2/19$ b. $19/100$ c. $1/50$ d. none of these

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50. Let A and B be two events such that $P(A \cap B') = 0.20, P(A' \cap B) = 0.15, P(A' \cap B') = 0.1$thenP(A//B)` is equal to

A. $11/14$

B. $2/11$

C. $2/7$

D. $1/7$

Answer: A

View Text Solution

51. A father has 3 children with at least one boy. The probability that he has 2 boys and 1 girl is $1/4$ b. $1/3$ c. $2/3$ d. none of these

A. $1/4$

B. $1/3$

C. $2/3$

D. None of these

Answer: B

View Text Solution

52. Ina certain town, 40% of the people have brown hair, 25% have brown eyes, and 15% have both brown hair and brown eyes. If a person selected at random from the town has brown hair, the probability that he also has brown eyes is $1/5$ b. $3/8$ c. $1/3$ d. $2/3$

A. $1/5$

B. $3/8$

C. $1/3$

D. $2/3$

Answer: B

Watch Video Solution

53. Let $A and B$ are events of an experiment and $P(A) = 1/4, P(A \cup B) = 1/2,$ then value of $P\left(B/A^c\right)$ is a.$2/3$ b. $1/3$ c. $5/6$ d. $1/2$

A. 2/3

B. 1/3

C. 5/6

D. 1/2

Answer: B

Watch Video Solution

54. The probability that an automobile will be stolen and found within one week is 0.0006. Then probability that an automobile will be stolen is 0.0015. the probability that a stolen automobile will be found in the week is 0. 3 b. 0. 4 c. 0. 5 d. 0. 6

A. 0.3

B. 0.4

C. 0.5

D. 0.6

Answer: B

Watch Video Solution

55. A pair of numbers is picked up randomly (without replacement) from the set {1,2,3,5,7,11,12,13,17,19}. The probability that the number 11 was picked given that the sum of the numbers was even is nearly a.0.1 b. 0.125 c. 0.24 d. 0.18

Watch Video Solution

56. All the jacks, queens, kings, and aces of a regular 52 cards deck are taken out. The 16 cards are thoroughly shuffled and m opponent, a person who always tells the truth, simultaneously draws two cards at random and says, I hold at least one ace. The probability that he holds two aces is $2/8$ b. $4/9$ c. $2/3$ d. $1/9$

A. $2/8$

B. $4/9$

C. $2/3$

D. $1/9$

Answer: D

Watch Video Solution

57. One ticket is selected at random from 100 tickets numbered $00, 01, 02, \ldots, 99$. Suppose A and B are the sum and product of the digit found on the ticket, respectively. Then $P((A = 7)/(B = 0))$ is given by

A. $2/13$

B. $2/19$

C. $1/50$

D. None of these

Answer: B

Watch Video Solution

58. about to only mathematics

A. $1/2$

B. $7/18$

C. $3/4$

D. $5/12$

Answer: D

Watch Video Solution

59. Cards are drawn one-by-one at random from a well-shuffled pack of 52 playing cards until 2 aces are obtained from the first time. The probability that 18 draws are obtained for this is a.$3/34$ b. $17/455$ c. $561/15925$ d. none of these

A. $3/34$

B. $17/455$

C. $561/15925$

D. None of these

Answer: C

Watch Video Solution

60. A bag contains n white and n red balls. Pairs of balls are drawn without replacement until the bag is empty. Show that the probability that each pair consists of one white and one red ball is $\frac{2^n}{{}^{2n}C_n}$

Watch Video Solution

61. A six-faced dice is so biased that it is twice as likely to show an even number as an odd number when thrown. It is thrown twice, the probability that the sum of two numbers thrown is even is a.$1/12$ b. $1/6$ c. $1/3$ d. $5/9$

A. $1/12$

B. $1/6$

C. $1/3$

D. $5/9$

Answer: D

Watch Video Solution

62. A student appears for tests I, II and III. The student is successful if he passes either in tests I and II or tests I and III. The probabilities of the student passing in tests I, II, and III are, respectively, p, q, and 1/2. then p(1+q)=

A. $1/2$

B. 1

C. $3/2$

D. $3/4$

Answer: B

Watch Video Solution

63. A problem in mathematics is given to three students A, B, C and their respective probability of solving the problem is 1/2, 1/3 and 1/4. Probability that the problem is solved is a.$3/4$ b. $1/2$ c. $2/3$ d. $1/3$

A. $3/4$

B. $1/2$

C. $2/3$

D. $1/3$

Answer: A

Watch Video Solution

64. Let A,B, C be three mutually independent events. Consider the two statements S_1 and S_2.

$S_1 : A$ and $B \cap C$are independent.

$S_2 : A$ and $B \cap C$are independent.

Then

A. both S_1 and S_2 are true

B. only S_1 is true

C. only S_2 is true

D. neither S_1 nor S_2 is true

Answer: A

Watch Video Solution

65. Three ships $A, B, and C$ sail from England to India. If the ratio of their arriving safely are 2:5, 3:7, and 6:11, respectively, then the probability of all the ships for arriving safely is $18/595$ b. $6/17$ c. $3/10$ d. $2/7$

A. 18/595

B. 6/17

C. 3/10

D. 2/7

Answer: A

Watch Video Solution

66. Cards are drawn one by one without replacement from a pack of 52 cards. The probability that 10 cards will precede the first ace is a. $\frac{241}{1456}$ b. $\frac{18}{625}$ c. $\frac{451}{884}$ d. none of these

A. 241/1456

B. 164/4168

C. 451/884

D. None of these

Answer: B

Watch Video Solution

67. Five horses are in a race. Mr. A selects two of the horses at random and bets on them. The probability that Mr. A selected the winning horse is $3/5$ b. $1/5$ c. $2/5$ d. $4/5$

A. $3/5$

B. $1/5$

C. $2/5$

D. $4/5$

Answer: C

Watch Video Solution

68. Let A and B be two events such that $p\left(\overline{A \cup B}\right) = \frac{1}{6}, p(A \cap B) = \frac{1}{4}$ and $p\left(\bar{A}\right) = \frac{1}{4}$, where $\bar{A}$ stands for the complement of the event A. Then the events A and B are (1) mutually exclusive and independent (2) equally likely but not independent (3) independent but not equally likely (4) independent and equally likely

A. equally likely but not independent equally likely and mutually exclusive

B. equually like and mutually exclusive

C. Mutually exclusive and independent

D. independent but not equally likely

Answer: D

Watch Video Solution

69. A class consists of 80 students, 25 of them are girls and 55 are boys. If 10 of them are rich and the remaining are poor and also 20 of them are intelligent, then the probability of selecting an intelligent rich girls is a. $5/128$ b. $25/128$ c. $5/512$ d. none of these

A. $5/128$

B. $25/128$

C. $5/512$

D. None of these

Answer: C

Watch Video Solution

70. Events $A and C$ are independent. If the probabilities relating $A, B, and C$ are $P(A) = 1/5, P(B) = 1/6; P(A \cap C) = 1/20; P(B \cup C) = 3/8.$ Then events $B and C$ are independent events $B and C$ are mutually exclusive events $BandC$ are neither independent nor mutually exclusive events $BandC$ are equiprobable

A. events B and C are independent

B. events B and C are mutually exclusive

C. events B and C are neiter independent nor mutually exclusive

D. events B and C are equiprobabile

Answer: A

Watch Video Solution

71. Let $AandB$ be two events. Suppose $P(A) = 0.4, P(B) = p, andP(A \cup B) = 0.7.$ The value of p for which $AandB$ are independent is $1/3$ b. $1/4$ c. $1/2$ d. $1/5$

A. $1/3$

B. $1/4$

C. $1/2$

D. $1/5$

Answer: C

Watch Video Solution

72. A box contains 2 black, 4 white, and 3 red balls. One ball is drawn at random from the box and kept aside. From the remaining balls in the box, another ball is drawn at random and kept aside the first. This process is repeated till all the balls are drawn front the box. The probability that the balls drawn are in the sequence of 2 black, 4 white, and 3 red is $1/1260$ b. $1/7560$ c. $1/126$ d. none of these

A. $1/1260$

B. $1/7560$

C. $1/126$

D. None of these

Answer: A

Watch Video Solution

73. If any four numbers are slected and they are multiplied, then the probability that the last digit will be $1, 3, 5$ or 7 is

A. $4/625$

B. $18/625$

C. $16/625$

D. None of these

Answer: C

Watch Video Solution

74. If odds against solving a question by three students are 2:1, 5:2, and 5:3, respectively, then probability that the question is solved only by one student is a.$31/56$ b. $24/56$ c. $25/56$ d. none of these

A. $31/56$

B. $24/56$

C. $23/56$

D. None of these

Answer: C

Watch Video Solution

75. An unbiased coin is tossed 6 times. The probability that third head appears on the sixth trial is a.$5/16$ b. $5/32$ c. $5/8$ d. $5/64$

A. $5/16$

B. $2/32$

C. $5/8$

D. $5/64$

Answer: B

Watch Video Solution

76. A coin is tossed 7 times. Then the probability that at least 4 consective heads apear is

A. $3/16$

B. $5/32$

C. $3/16$

D. $1/8$

Answer: B

View Text Solution

77. Three critics review a book. Odds in favour of the book are 5:2, 4:3 and 3:4 respectively for three critics. Find the probability that eh majority are in favour of the book.

A. $35/49$

B. $125/343$

C. $164/343$

D. $209/343$

Answer: D

Watch Video Solution

78. $A and B$ play a game of tennis. The situation of the game is as follows: if one scores two consecutive points after a deuce, he wins; if loss of a point is followed by win of a point, it is deuce. The chance of a server to win a point is 2/3. The game is a deuce and A is serving. Probability that A will win the match is (serves are change after each game) $3/5$ b. $2/5$ c. $1/2$ d. $4/5$

A. $3/5$

B. $2/5$

C. $1/2$

D. $4/5$

Answer: C

View Text Solution

79. An unbiased cubic die marked with 1,2,2,3,3,3 is rolled 3 times. The probability of getting a total score of 4 or 6 is $16/216$ b. $50/216$ c. $60/216$ d. none of these

A. $16/216$

B. $50/216$

C. $60/216$

D. None of these

Answer: B

Watch Video Solution

80. A fair die is tossed repeatedly. A wins if if is 1 or 2 on two consecutive tosses and B wins if it is 3,4,5 or 6 on two consecutive tosses. The probability that A wins if the die is tossed indefinitely is $1/3$ b. $5/21$ c. $1/4$ d. $2/5$

A. $1/3$

B. $5/21$

C. $1/4$

D. $2/5$

Answer: B

View Text Solution

81. Whenever horses a, b, c race together, their respective probabilities of winning the race are 0.3, 0.5, and 0.2 respectively. If they race three times, the pr4obability t hat the same horse wins all the three races, and the probability that a, b, c each wins one race are, respectively. $8/50, 9/50$ b. $16/100, 3/100$ c. $12/50, 15/50$ d. $10/50, 8/50$

A. $8/50, 9/50$

B. $16/100, 3/100$

C. $12/50, 15/50$

D. $10/50, 8/50$

Answer: A

Watch Video Solution

82. A man alternately tosses a coin and throws a die beginning with the coin. The probability that he gets a head in the coin before he gets a 5 or 6 in the dice is a.$3/4$ b. $1/2$ c. $1/3$ d. none of these

A. $3/4$

B. $1/2$

C. $1/3$

D. None of these

Answer: A

Watch Video Solution

83. If p is the probability that a man aged x will die in a year, then the probability that out of n men A_1, A_2, A_n each aged x, A_1 will die in an year and be the first to die is $1-(1-p)^n$ b. $(1-p)^n$ c. $1/n\left[1-(1-p)^n\right]$ d. $1/n(1-p)^n$

A. $1-(1-p)^n$

B. $(1-p)^n$

C. $1/n\left[1-(1-p)^n\right]$

D. $1/n(1-p)^n$

Answer: C

Watch Video Solution

84. Thirty two players ranked 1 to 32 are playing is a knockout tournament. Assume that in every match between any two players, the better ranked player wins the probability that ranked 1 and ranked 2 players are winner and runner up, respectively, is $16/31$ b. $1/2$ c. $17/31$ d. none of these

A. $16/31$

B. $1/2$

C. $17/31$

D. None of these

Answer: A

Watch Video Solution

85. A pair of unbiased dice are rolled together till a sum of either 5 or 7 is obtained. Then find the probability that 5 comes before 7.

A. `2//5

B. $3/5$

C. $4/5$

D. None of these

Answer: A

Watch Video Solution

86. A fair coin is tossed 10 times. Then the probability that two heads do not occur consecutively is a.$7/64$ b. $1/8$ c. $9/16$ d. $9/64$

A. $7/64$

B. $1/8$

C. $9/16$

D. $9/64$

Answer: D

Watch Video Solution

87. A die is thrown a fixed number of times. If probability of getting even number 3 times is same as the probability of getting even number 4 times, then probability of getting even number exactly once is a.$1/6$ b. $1/9$ c. $5/36$ d. $7/128$

A. $1/6$

B. `1//9

C. $5/36$

D. $7/128$

Answer: D

Watch Video Solution

88. A pair of fair dice is thrown independently three times. The probability of getting a score of exactly 9 twice is

A. $8/9$

B. $7/29$

C. $8/243$

D. $1/729$

Answer: C

Watch Video Solution

89. The probability that a bulb produced by a factory will fuse after 150 days if used is 0.05. what is the probability that out of 5 such bulbs none will fuse after 150 days of use? a.$1 - \left(\frac{19}{20}\right)^5$ b. $\left(\frac{19}{20}\right)^5$ c. $\left(\frac{3}{4}\right)^5$ d. $90\left(\frac{1}{4}\right)^5$

A. $1 - (19/20)^5$

B. $(19/20)^5$

C. $(3/4)^5$

D. $90(1/4)^5$

Answer: B

Watch Video Solution

90. The box contains tickets numbered from 1 to 20. Three tickets are drawn from the box with replacement. The probability that the largest number on the tickets is 7 is $2/19$ b. $7/20$ c. 1 - $(7/200)^3$ d. none of these

A. $2/19$

B. $7/20$

C. 1 - $(7/20)^3$

D. None of these

Answer: D

Watch Video Solution

91. Two players toss 4 coins each. The probability that they both obtain the same number of heads is a.$5/256$ b. $1/16$ c. $35/128$ d. none of these

A. $5/256$

B. $1/16$

C. $35/128$

D. None of these

Answer: C

Watch Video Solution

92. A coin is tossed $2n$ times. The chance that the number of times one gets head is not equal to the number of times one gets tails is $\frac{(2n!)}{(n!)^2}\left(\frac{1}{2}\right)^{2n}$ b. $1 - \frac{(2n!)}{(n!)^2}$ c. $1 - \frac{(2n!)}{(n!)^2}\frac{1}{\left(4^n\right)}$ d. none of these

A. $\frac{(2n!)}{(n!)^2}\left(\frac{1}{2}\right)^{2n}$

B. $1 - \frac{(2n!)}{(n!)^2}$

C. $1 - \frac{(2n!)}{(n!)^2}\frac{1}{4^n}$

D. None of these

Answer: C

Watch Video Solution

93. A box contains 24 identical balls of which 12 are white and 12 are black. The balls are drawn at random from the box one at a time with replacement. The probability that a white ball is drawn for the 4th time on the 7th draw is $5/64$ b. $27/32$ c. $5/32$ d. $1/2$

A. $5/64$

B. $27/32$

C. $5/32$

D. $1/2$

Answer: C

Watch Video Solution

94. In a game a coin is tossed $2n + m$ times and a player wins if he does not get any two consecutive outcomes same for at least $2n$ times in a row. The probability that player wins the game is a. $\frac{m+2}{2^{2n}+1}$ b. $\frac{2n+2}{2^{2n}}$ c. $\frac{2n+2}{2^{2n+1}}$ d. $\frac{m+2}{2^{2n}}$

A. $\frac{m+2}{2^{2n}+1}$

B. $\frac{2n+2}{2^{2n}}$

C. $\frac{2n+2}{2^{2n+1}}$

D. $\frac{m+2}{2^{2n}}$

Answer: D

Watch Video Solution

95. If $A and B$ each toss three coins. The probability that both get the same number of heads is $1/9$ b. $3/16$ c. $5/16$ d. $3/8$

A. $1/9$

B. $3/16$

C. $5/16$

D. $3/8$

Answer: C

Watch Video Solution

96. A fair coin is tossed 100 times. The probability of getting tails 1, 3, .., 49 times is $1/2$ b. $1/4$ c. $1/8$ d. $1/16$

A. $1/2$

B. $1/4$

C. $1/8$

D. $1/16$

Answer: B

Watch Video Solution

97. A fair die is thrown 20 times. The probability that on the 10th throw, the fourth six appears is $\wedge 20C_{10} \times 5^6/6^{20}$ b. $120 \times 5^7/6^{10}$ c. $84 \times 5^6/6^{10}$ d. none of these

A. ${}^{20}C_{10} \times 5/{}^6/6^{20}$

B. $120 \times 5^7/6^{10}$

C. $84 \times 5^6/6^{10}$

D. None of these

Answer: C

Watch Video Solution

98. A speaks truth in 605 cases and B speaks truth in 70% cases. The probability that they will say the same thing while describing a single event is $2/19$ b. $3/29$ c. $17/19$ d. $4/29$

A. 0.56

B. 0.54

C. 0.38

D. 0.94

Answer: B

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99. The probability that a teacher will give a surprise test during any class is 1/5. If a student is absent on two day what is the probability that he will miss atleast one test.

A. $\frac{4}{5}$

B. $\frac{2}{5}$

C. $\frac{7}{25}$

D. $\frac{9}{25}$

Answer: D

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100. There are two urns $A and B$. Urn A contains 5 red, 3 blue and 2 white balls, urn B contains 4 re3d, 3 blue, and 3 white balls. An urn is chosen at random and a ball is drawn. Probability that eh bal drawn is red is $9/10$ b. $1/2$ c. $11/20$ d. $9/20$

A. $9/10$

B. $1/2$

C. $11/20$

D. $9/20$

Answer: D

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101. A bag contains 20 coins. If the probability that the bag contains exactly 4 biased coin is 3/4 and that of exactly 5 biased coin is 2/3, then the probability that all the biased coin are sorted out from bag is exactly 10 draws is $\frac{5}{10}\frac{\wedge(16)C_6}{\wedge(20)C_9}+\frac{1}{11}\frac{\wedge(15)C_5}{\wedge(20)C_9}$ b. $\frac{2}{33}\left[\frac{\wedge(16)C_6+5^{15}C_5}{\wedge(20)C_9}\right]$ c. $\frac{5}{33}\frac{\wedge(16)C_7}{\wedge(20)C_9}+\frac{1}{11}\frac{\wedge(15)C_6}{\wedge(20)C_9}$ d. none of these

A. $\frac{5}{10}\frac{{}^{16}C_6}{{}^{20}C_9}+\frac{1}{11}\frac{{}^{15}C_5}{{}^{20}C_9}$

B. $\frac{2}{33}\left[\frac{{}^{16}C_6+5^{15}C_5}{{}^{20}C_9}\right]$

C. $\frac{5}{33}\frac{{}^{16}C_7}{{}^{20}C_9}+\frac{1}{11}\frac{{}^{15}C_6}{{}^{20}C_9}$

D. None of these

Answer: B

Watch Video Solution

102. A bag contains 3 red and 3 green balls and a person draws out 3 at random. He then drops 3 blue balls into the bag and again draws out 3 at random. The chance that the 3 later balls being all of different colors is 15 % b. 20 % c. 27 % d. 40 %

A. 15 %

B. 20 %

C. 27 %

D. 40 %

Answer: C

Watch Video Solution

103. A bag contains 20 coins. If the probability that the bag contains exactly 4 biased coin is 3/4 and that of exactly 5 biased coin is 2/3, then the probability that all the biased coin are sorted out from bag is exactly

10 draws is $\frac{5}{10}\frac{\wedge(16)C_6}{\wedge(20)C_9}+\frac{1}{11}\frac{\wedge(15)C_5}{\wedge(20)C_9}$ b. $\frac{2}{33}\left[\frac{\wedge(16)C_6+5^{15}C_5}{\wedge(20)C_9}\right]$ c. $\frac{5}{33}\frac{\wedge(16)C_7}{\wedge(20)C_9}+\frac{1}{11}\frac{\wedge(15)C_6}{\wedge(20)C_9}$ d. none of these

A. $\frac{5}{33}\frac{^{16}C_6}{^{20}C_9}+\frac{1}{11}\frac{^{15}C_5}{^{20}C_9}$

B. $\frac{2}{33}\left[\frac{^{16}C_6+5^{15}C_5}{^{20}C_6}\right]$

C. $\frac{5}{33}\frac{^{16}C_7}{^{20}C_9}+\frac{1}{11}\frac{^{15}C_6}{^{20}C_9}$

D. None of these

Answer: C

Watch Video Solution

104. An urn contains three red balls and n white balls. Mr. A draws two balls together from the urn. The probability that they have the same color is $1/2$. Mr.B draws one ball from the urn, notes its color and rplaces it. He then draws a second ball from the urn and finds that both balls have the same color is $5/8$. The value of n is ____.

A. 9

B. 6

C. 5

D. 1

Answer: D

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105. A student can solve 2 out of 4 problems of mathematics, 3 out of 5 problem of physics, and 4 out of 5 problems of chemistry. There are equal number of books of math, physics, and chemistry in his shelf. He selects one book randomly and attempts 10 problems from it. If he solves the first problem, then the probability that he will be able to solve the second problem is $2/3$ b. $25/38$ c. $13/21$ d. $14/23$

A. $2/3$

B. $25/38$

C. $13/21$

D. $14/23$

Answer: B

View Text Solution

106. An event X can take place in conjuction with any one of the mutually exclusive and exhaustive events $A, BandC$. If A, B, C are equiprobable and the probability of X is 5/12, and the probability of X taking place when A has happened is 3/8, while it is 1/4 when B has taken place, then the probabililty of X taking place in conjuction with C is $5/8$ b. $3/8$ c. $5/24$ d. none of these

A. $5/8$

B. $3/8$

C. $5/24$

D. None of these

Answer: A

Watch Video Solution

107. An artillery target may be either at point I with probability 8/9 or at point II with probability 1/9 we have 55 shells, each of which can be fired either at point I or II. Each shell may hit the target, independent of the other shells, with probability 1/2. Maximum number of shells must be fired a point I to have maximum probability is a.20 b. 25 c. 29 d. 35

A. 20

B. 25

C. 29

D. 35

Answer: C

Watch Video Solution

108. A bag contains some white and some black balls, all combinations of balls being equally likely. The total number of balls in the bag is 10. If there ball are drawn at random without replacement and all of them are found to be black, the probability that eh bag contains 1 white and 9 black balls is a.$14/55$ b. $12/55$ c. $2/11$ d. $8/55$

A. $14/55$

B. $15/55$

C. $2/11$

D. $8/55$

Answer: A

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109. A letter is known to have come either from LONDON or CLIFTON. On the envelope just two consecutive letters ON are visible. What is the probability that the letter has come from (i) LONDON (ii) CLIFTON?

A. $1/7$

B. $12/17$

C. $17/30$

D. $3/5$

Answer: B

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110. A doctor is called to see a sick child. The doctor knows (prior to the visit) that 90% of the sick children in that neighbourhood are sick with the flu, denoted by F, while 10% are sick with the measles, denoted by M. A well-known symptom of measles is a rash, denoted by R. The probability having a rash for a child sick with the measles is 0.95. however, occasionally children with the flu also develop a rash, with conditional probability 0.08. upon examination the child, the doctor finds a rash. The what is the probability that the child has the measles? $91/165$ b. $90/163$ c. $82/161$ d. $95/167$

A. $91/165$

B. $90/163$

C. $82/161$

D. $95/167$

Answer: D

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111. On a Saturday night, 20%of all drivers in U.S.A. are under the influence of alcohol. The probability that a drive under the influence of alcohol will have an accident is 0.001. The probability that a sober drive will have an accident is 0.00. if a car on a Saturday night smashed into a tree, the probability that the driver was under the influence of alcohol is $3/7$ b. $4/7$ c. $5/7$ d. $6/7$

A. $3/7$

B. $4/7$

C. $5/7$

D. $6/7$

Answer: C

Watch Video Solution

112. A purse contains 2 six-sided dice. One is a normal fair die, while the other has two 1s two 3s,and two 5s. A die is pi9cked up and rolled. Because of some secret magnetic attraction of the unfair die, there is 75% chance of picking the unfair die and a 25% chance of picking a fair die. The dice is rolled and shows up the face 3. The probability that a fair die was picked up is $1/7$ b. $1/4$ c. $1/6$ d. $1/24$

A. $1/7$

B. $1/4$

C. $1/6$

D. $1/24$

Answer: A

Watch Video Solution

113. There are 3 bags which are known to contain 2 white and 3 black, 4 white and 1 black, and 3 white and 7 black ball, respectively. A ball is drawn at random from one of the bags and found to the black ball. Then the probability that it was drawn from the bag containing the most black ball is a.$7/15$ b. $5/19$ c. $3/4$ d. none of these

A. $7/15$

B. $5/19$

C. $3/4$

D. None of these

Answer: A

Watch Video Solution

114. A hat contains a number of cards with 30% white on both sides, 50% black on one side and whit e on the other side, 20% black on both sides. The cards are mixed up, and a single card is drawn at random and placed on the table. Its upper side shows up black. The probability that its other side is also black is $2/9$ b. $4/9$ c. $2/3$ d. $2/7$

A. $2/9$

B. $4/9$

C. $2/3$

D. $2/7$

Answer: B

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Exercise (Multiple)

1. If A and B are any two events, then the probability that exactly one of them occur is

A. $P(A) + P(B) - 2P(A \cap B)$

B. $P\left(A \cap \bar{B}\right) + P\left(\bar{A} \cap B\right)$

C. $P(A \cup B) - P(A \cap B)$

D. $P\left(\bar{A}\right) + P\left(\bar{B}\right) - 2P\left(\bar{A} \cap \bar{B}\right)$

Answer: A::B::C::D

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2. If p and q are chosen randomly from the set {1, 2, 3, 4, 5, 6, 7, 8, 9, 10} with replacement then determine the probability that the roots of the equation $x^2 + px + q = 0$ are real.

A. are real is 33/50

B. are imaginary is 19/50

C. are real and equal is 3/50

D. are real and distinct is 3/5

Answer: B::C::D

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3. If A and B are two events such that $P(A) = \frac{3}{4}$ and $P(B) = \frac{5}{8}$, and $P(A \cup B) = \frac{3}{4}$ then $P(A \mid B).P(A' \mid B)$ is equal to

A. 3//4`

B. $6/25$

C. '3//8'

D. 0

Answer: A::B::C::D

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4. If A and B are mutually exclusive events, then

A. $P(A) \leq P(\bar{B})$

B. $P(A) > P(B)$

C. $P(B) \leq P(\bar{A})$

D. $P(A) > P(B)$

Answer: A::C

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5. Probability if n heads in $2n$ tosses of a fair coin can be given by

$\prod_{r=1}^{n}\left(\frac{2r-1}{2r}\right)$ b. $\prod_{r=1}^{n}\left(\frac{n+r}{2r}\right)$ c. $\sum_{r=0}^{n}\left(\frac{\wedge nC_r}{2^n}\right)$ d. $\frac{\sum r = 0n\left(\wedge nC_r\right)^2}{\sum r = 02n\left(\wedge (2n)C_r\right)^{\square}}$

A. $\prod_{r=1}^{n}\left(\frac{2r-1}{2r}\right)$

B. $\prod_{r=1}^{n}\left(\frac{n+r}{2r}\right)$

C. $\Sigma_{r=0}^{n}\left(\frac{.^{n}C_{r}}{2^{n}}\right)^{2}$

D. $\dfrac{\Sigma_{r=0}^{n}\left(.^{n}C_{r}\right)^{2}}{\left(\Sigma_{r=0}^{2n}.^{2n}C_{r}\right)}$

Answer: A::C::D

Watch Video Solution

6. The chance of an event happening is the square of the chance of a second event but the odds against the first are the cube of the odds against the second. The chances of the events are

A. $P_1 = 1/9$

B. $P_1 = 1/16$

C. $P_2 = 1/3$

D. $P_2 = 1/4$

Answer: A::C

Watch Video Solution

7. A bag contains 6 blue balls and 5 green balls and 2 red balls. A ball is chosen at random. What is the probability of getting a red ball?

A. b + r = 9

B. br = 18

C. $|b - r| = 4$

D. $b/r = 2$

Answer: A::B

Watch Video Solution

8. Two numbers are chosen from {1, 2, 3, 4, 5, 6, 7, 8} one after another without replacement. Then the probability that

A. the smallest value of two is less than 3 is $13/28$

B. the bigger value of two is more than 5 is $9/14$

C. product of two number is even is $11/14$

D. none of these

Answer: A::B::C

Watch Video Solution

9. If A and B are two independent events such that P (A) =$1/2$, $P(B) = 1/5$, then

A. $P(A \cup B) = 3/5$

B. $P(A \mid B) = 1/4$

C. $P(A/A \cup B) = 5/6$

D. $P\left(A \cap B \mid \bar{A} \cup \bar{B}\right) = 0$

Answer: A::C::D

Watch Video Solution

10. Let $AandB$ be two events such that $P\left(A \cap B'\right) = 0.20, P\left(A' \cap B\right) = 0.15, P\left(A' \cap B'\right) = 0.1, thenP(A/B)$ is equal to $11/14$ b. $2/11$ c. $2/7$ d. $1/7$

A. $P(A \mid B) = 2/7$

B. $P(A \mid B) = 2/7$

C. $P(A \cup B) = 0.55$

D. $P(A \mid B) = 1/2$

Answer: A::B::C

View Text Solution

11. The probability that a married man watches a certain TV show is 0.4 and the probability that a marrided women watches the shwo is 0.5 The probability that a man watches the show, given that his wife does, id 0.7. Then

A. the probability that married couple watches the show is 0.35

B. the probability that a wife watches the show given that her husband does is $7/8$

C. the probability that at least one person of a married couple will watch the show is 0.55

D. None of these

Answer: A::B::C

View Text Solution

12. $A and B$ are two events define3d as follows: A:It rains today with $P(A) = 40\%$ B: It rains tomorrow with $P(B) = 50\%$ Also, P (it rains today and tomorrow) $= 30\,\%$ Also, $E_1 : P(A \cap B)/(A \cup B)$ and $E_2 : P(\{(A \cap B) \text{ or } (B \cup A)\}/(A \cup B))$. Then which of the following is/are true ? $AandB$ are independent `P(A//B)

A. $P(A/B) < P(B/A)$

B. $P(A/B) < P(B/A)$

C. E_1 and E_2 are equiprobable

D. $P(A/(A \cup B)) = P(B/(A \cup B))$

Answer: B::C

Watch Video Solution

13. Two whole numbers are randomly selected and multiplied. Consider two events E_1 and E_2 defined as E_1 : Their product is divisible by 5 and E_2 Unit's place in their product is 5 Which of the following statement(s) is/are correct?

A. E_1 is twice as likely to occur as E_2

B. E_1 and E_2 are disjoint

C. $P(E_2/E^1) = 1/4$

D. $P(E_1/E_2) = 1$

Answer: C::D

Watch Video Solution

14. The probability that a 50-years-old man will be alive at 60 is 0.83 and the probability that a 45-years-old women will be alive at 55 is 0.87. Then

A. the probability that both will be alive is 0.7221

B. at least one of them will alive is 0.9779

C. at least one of them will alive is 0.8230

D. the probability that both will be alive is 0.6320

Answer: A::B

View Text Solution

15. Which of the following statement is/are correct?

A. Three coins are tossed once. At least two of them must land the same way. No matter whether they land heads or tails, the third coin is equally likely to land either the same ways or oppositely. So, the chance that all the three coins land the same ways is $1/2$.

B. $Let 0 < P(B) < 1$ and $P(A \mid B) = P\left(A/B^{C}\right)$. Then A and B are independent.

C. Suppose an urn contains "w" white and "b" black balls and a ball is drawn from it and is replaced along with "d" additional balls of the same color. Now a second ball is drawn from it. The proability that the second drawn ball is ehite in independent of the value of "d"

D. A,B,C simultaneously satisfy

$P(ABC) = P(A)P(B)P(C)$

$P\left(AB\bar{C}\right) = P(A)P(B)P\left(\bar{C}\right)$

$$P\left(A\bar{B}C\right) = P(A)P\left(\bar{B}\right)P(C)$$

$$P(A - BC) = P\left(\bar{A}\right)P(B)P(C)$$

Then A, B C are independent.

Answer: B::C::D

Watch Video Solution

16. A bag initially contains 1 red and 2 blue balls. An experiment consisting of selecting a ball at random, noting its color and replacing it together with an additional ball of the same colour. If three such trials are made, then

A. probability that at least one blue balls is drawn is 0.9

B. probability that exactly one blue all is drawn is 0.2

C. probability that all the drawn balls are red given that all the drawn balls are of same color is 0.2

D. probability that at least one red ball is drawn is 0.6

Answer: A::B::C::D

View Text Solution

17. $P(A) = 3/8, P(B) = 1/2, P(A \cup B) = 5/8,$ which of the following do/does hold good?

A. $P(A^C/B) = 2P(A/B^C)$

B. $P(B) = P(A/B)$

C. $15P(A^C/B^C) = 8P(B/A^C)$

D. $P(A/B^C) = (A \cap B)$

Answer: A::B::C::D

Watch Video Solution

18. In a precision bombing attack, there is a 50% chance that any one bomb will strick the target. Two direct hits are required to destroy the target completely. The number of bombs which should be dropped to give a 99% chance or better of completely destroying the target can be

A. 12

B. 11

C. 10

D. 13

Answer: A::B::D

Watch Video Solution

19. If A and B are two events, then which one of the following is/are always true?

A. $P(A \cap B) \geq P(A) + P(B) - 1$

B. $P(A \cap B) \leq P(A)$

C. $P(A' \cap B') \geq P(A') + P(B') - 1$

D. $P(A \cap B) = P(A)P(B)$

Answer: A::B::C

View Text Solution

20. If A and B are two independent events such that $P(A_{\square}) = 1/2$ and $P(B) = 1/5$, then

A. $P(A/B) = 1/2$

B. $P\left(\frac{A}{A \cup B}\right) = \frac{5}{6}$

C. $P\left(\frac{A \cap B}{A' \cup B'}\right) = 0$

D. None of these

Answer: A::B::C

Watch Video Solution

21. If A and B are two independent events such that $P(\bar{A} \cap B) = \frac{2}{15}$ and $P(A \cap \bar{B}) = \frac{1}{6}$ then $P(B) =$

A. $1/5$

B. $1/6$

C. $4/5$

D. $5/6$

Answer: B::C

Watch Video Solution

22. Two buses A and B are scheduled to arrive at a town central bus station at noon. The probus A will be late is $\frac{1}{5}$. The probability that bus B will be late is $\frac{7}{25}$. The probability that the bus B is late given that bus A is late is $\frac{9}{10}$. Then the probabilities: neither bus will be late on a particular day.

A. probability that neither bus will be late on a particular dat is $7/10$

B. probability that bus A is late given that bus B is late is $18/28$

C. probability that at least ne bus is late is $3/10$

D. probability that at least one bus is in time is $4/5$

Answer: A::B::C

Watch Video Solution

23. A fair coin is tossed 99 times. If X is the number of times heads occur, then $P(X=r)$ is maximum when r is a.$49, 50$ b. $50, 51$ c. $51, 52$ d. none of these

A. 49

B. 52

C. 51

D. 50

Answer: A::D

Watch Video Solution

24. If the probability of chossing an interger "k" out of 2m integers $1, 2, 3, \ldots, 2m$ is inversely proportional to $k^4(1 \le k \le m). If x_1$ is the probability that chosen number is odd and x^2 is the probability that chosen number is even, then

A. $x_1 > 1/2$

B. $x_1 > 2/3$

C. $x_2 < 1/2$

D. $x_2 < 2/3$

Answer: A::C

Watch Video Solution

25. A lot contains 50 defective and 50 non-defectivebulbs. Two bulbs are drawn at random one at a time withreplacementevents A, and as first bul. The B C are defined theis defective, the second bulb is non-defective, the two banboth defective or non-defective, respectively. Then,(a) A, B and C are pairwise independent(b) A, B and C are pairwise not independent(c) A, B and C are independent(d) None of the above

A. A and B are independent

B. B and C are independent

C. A and C are independent

D. A,B and C are pairwise independent

Answer: A::B::C

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Exercise (Comprehension)

1. Find the derivative of $y = 6^{2x}$.

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2. A shoping mall is running a scheme: Each packet of detergent SURF contains a coupon which bears letter of the word SURF, if a person buys at least four packets of detergent SURF, and produce all the letters of the word SURF, then he gets one free packet of detergent.

If person buys 8 such packets, then the probability that he gets exactly one free packets is

A. $7/33$

B. $102/495$

C. $13/55$

D. $34/165$

Answer: D

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3. A shoping mall is running a scheme: Each packet of detergent SURF contains a coupon which bears letter of the word SURF, if a person buys at least four packets of detergent SURF, and produce all the letters of the word SURF, then he gets one free packet of detergent.

If a person buys 8 such packets, then the probability that he gets two free packets is

A. $1/7$

B. $1/5$

C. $1/42$

D. $1/165$

Answer: D

Watch Video Solution

4. There are two die A and B both having six faces. Die A has three faces marked with 1, two faces marked with 2, and one face marked with 3. Die B has one face marked with 1, two faces marked with 2, and three faces marked with 3. Both dices are thrown randomly once. If E be the event of getting sum of the numbers appearing on top faces equal to x and let $P(E)$ be the probability of event E, then $P(E)$ is maximum when x equal to

A. 5

B. 3

C. 4

D. 6

Answer: C

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5. There are two die A and B both having six faces. Die A has three faces marked with 1, two faces marked with 2, and one face marked with 3. Die

B has one face marked with 1, two faces marked with 2, and three faces marked with 3. Both dices are thrown randomly once. If E be the event of getting sum of the numbers appearing on top faces equal to x and let $P(E)$ be the probability of event E, then $P(E)$ is maximum when x equal to

A. 3

B. 4

C. 5

D. 6

Answer: B

Watch Video Solution

6. There are two die A and B both having six faces. Die A has three faces marked with 1, two faces marked with 2, and one face marked with 1, two faces marked with 2, and one face marked with 3. Die B has one face marked with 1, two faces marked with 2, and three faces marked with 3. Both dices are thrown randomly once. If E be the event of getting sum of the numbers appearing on top faces equal to x and let P(E) be the probability of event E, then

When x = 4, then P(E) is equal to

A. $5/9$

B. $6/7$

C. $7/18$

D. $8/19$

Answer: C

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7. A cube having all of its sides painted is cut by two horizontal, two vertical, and other two planes so as to form 27 cubes all having the same dimensions. Of these cubes, a cube is selected at random.

The probability that the cube selected has none of its sides painted is

A. $1/9$

B. $1/27$

C. $1/18$

D. $5/54$

Answer: B

Watch Video Solution

8. A cube having all of its sides painted is cut by two horizontal, two vertical, and other two planes so as to form 27 cubes all having the same dimensions. Of these cubes, a cube is selected at random.

The probability that the cube selected has two sides painted is

A. $1/9$

B. $4/9$

C. $8/27$

D. none of these

Answer: B

Watch Video Solution

9. A cube having all of its sides painted is cut by two horizontal, two vertical, and other two planes so as to form 27 cubes all having the same dimensions. Of these cubes, a cube is selected at random.

The total number of cubes having at least one of its sides painted is

A. 18

B. 20

C. 22

D. 26

Answer: D

Watch Video Solution

10. There are some experiment in which the outcomes cannot be identified discretely. For example, an ellipse of eccentricity $2\sqrt{2}/3$ is inscribed in a circle and a point within the circle is chosen at random. Now, we want to find the probability that this point lies outside the ellipse. Then, the point must lie in the shaded region shown in Figure. Let the radius of the circle be a and length of minor axis of the ellipse be 2b.

Given that

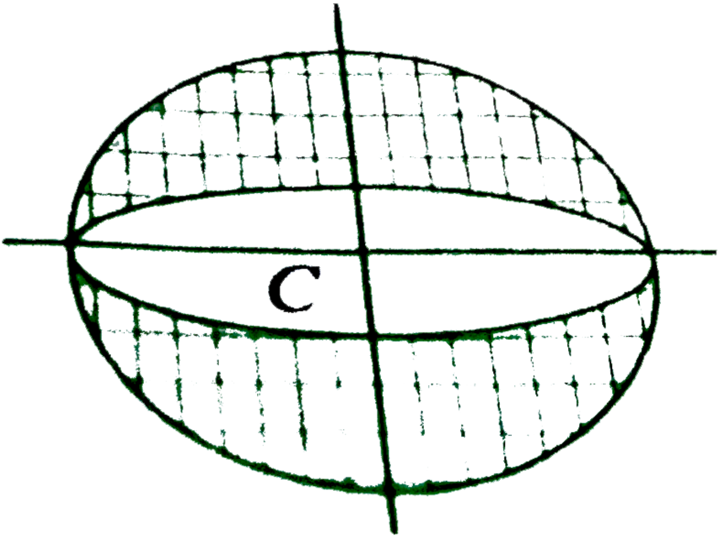
$$1 - \frac{b^2}{a^2} = \frac{8}{9} \text{ or } \frac{b^2}{a^2} = \frac{1}{9}$$

Then, the area of circle serves as sample space and area of the shaded region represents the area for favorable cases. Then, required probability is

$$p = \frac{\text{Area of shaded region}}{\text{Area of circle}}$$

$$= \frac{\pi a^2 - \pi ab}{\pi a^2} = 1 - \frac{b}{a} = 1 - \frac{1}{3} = \frac{2}{3}$$

Now, answer the following questions.



A point is selected at random inside a circle. The probability that the point is closer to the center of the circle than to its circumference is

A. $1/4$

B. $1/2$

C. $1/3$

D. $1/\sqrt{2}$

Answer: A

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11. There are some experiment in which the outcomes cannot be identified discretely. For example, an ellipse of eccentricity $2\sqrt{2}/3$ is inscribed in a circle and a point within the circle is chosen at random. Now, we want to find the probability that this point lies outside the ellipse. Then, the point must lie in the shaded region shown in Figure. Let the radius of the circle be a and length of minor axis of the ellipse be 2b.

Given that

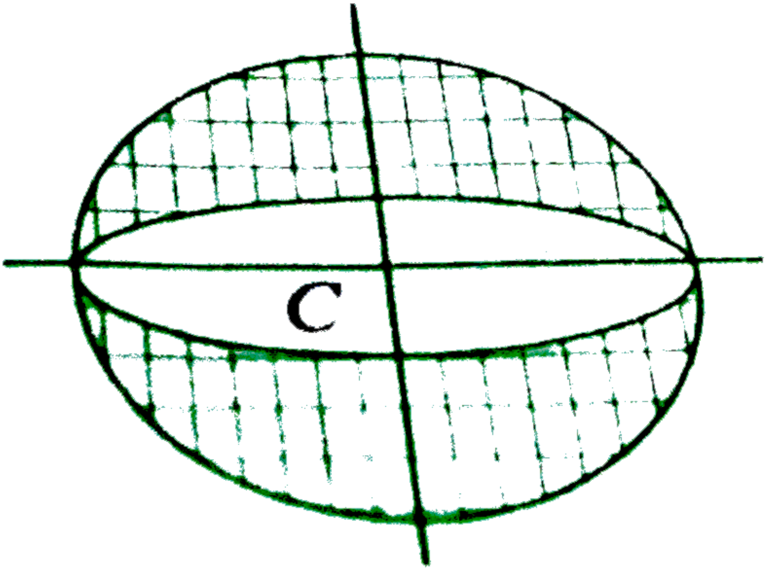
$$1 - \frac{b^2}{a^2} = \frac{8}{9} \text{ or } \frac{b^2}{a^2} = \frac{1}{9}$$

Then, the area of circle serves as sample space and area of the shaded region represents the area for favorable cases. Then, required probability is

$$p = \frac{\text{Area of shaded region}}{\text{Area of circle}}$$

$$= \frac{\pi a^2 - \pi ab}{\pi a^2} = 1 - \frac{b}{a} = 1 - \frac{1}{3} = \frac{2}{3}$$

Now, answer the following questions.



Two persons A and B agree to meet at a place between 5 and 6 pm. The first one to arrive waits for 20 min and then leave. If the time of their arrival be independant and at random, then the probability that A and B meet is

A. $1/3$

B. $1/3$

C. $2/3$

D. $5/9$

Answer: D

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12. If the squares of a 8×8 chess board are painted either red and black at random .The probability that not all squares is any alternating in colour is

A. $\left(1 - 1/2^7\right)^8$

B. $1/2^{56}$

C. $1 - 1/2^7$

D. none of these

Answer: A

Watch Video Solution

13. If the squares of a 8×8 chessboard are painted either red or black at random.

The probability that not all the squares in any column are alternating in color is

A. $\frac{.^{64}C_{32}}{2^{64}}$

B. $\frac{64!}{32!.2^{64}}$

C. $\frac{2^{32}-1}{2^{64}}$

D. none of these

Answer: A

Watch Video Solution

14. If the squares of a 8×8 chessboard are painted either red or black at random.

The probability that not all the squares in any column are alternating in color is

A. $1/2^{64}$

B. $1/2^{63}$

C. $1/2$

D. none of these

Answer: B

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15. In a class of 10 student, probability of exactly I students passing an examination is directly proportional to i^2. Then answer the following questions:

The probability that exactly 5 students passing an examination is

A. $1/11$

B. $5/77$

C. $25/77$

D. $10/77$

Answer: B

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Watch Video Solution

16. Evaluate $\int \frac{x^4 + x^2 + 1}{x^2 - x + 1} dx$

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17. In a class of 10 student, probability of exactly I students passing an examination is directly proportional to i^2. Then answer the following questions:

If a students selected at random is found to have passed the examination, then the probability that he was the only student who has passed the examination is

A. $1/3025$

B. $1/605$

C. $1/275$

D. $1/121$

Answer: A

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18. In an objective paper, there are two sections of 10 questions each.For "section 1", each question has 5 options and only one optionis correct and "section 2" has 4 options with multiple answers and marks for a question in this section is awarded only if he ticks all correct answers. Marks for each question in "sectionl 1" is 1 and in "section 2" is 3. (There is no negative marking.) If a candidate attempts only two questions by guessing, one from "section 1" and one from "section 2", the probability that he scores in both question is

A. $74/75$

B. $1/25$

C. $1/15$

D. $1/75$

Answer: D

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19. In an objective paper, there are two sections of 10 questions each.For "section 1", each question has 5 options and only one optionis correct and "section 2" has 4 options with multiple answers and marks for a question in this section is awarded only if he ticks all correct answers. Marks for each question in "sectionl 1" is 1 and in "section 2" is 3. (There is no negative marking.) If a candidate in total attempts 4 questions by guessing ,then the probability of scoring 10marks is

A. $1/5(1/15)^3$

B. $4/5(1/15)^3$

C. $1/5(14/15)^3$

D. None of these

Answer: D

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20. In an objective paper, there are two sections of 10 questions each.For "section 1", each question has 5 options and only one optionis correct and "section 2" has 4 options with multiple answers and marks for a question in this section is awarded only if he ticks all correct answers. Marks for each question in "sectionl 1" is 1 and in "section 2" is 3. (There is no negative marking.) If a candidate attempts only two questions by guessing, one from "section 1" and one from "section 2", the probability that he scores in both question is $\frac{74}{75}$

A. $(1/75)^{10}$

B. $1 - (1/75)^{10}$

C. $(74/75)^{10}$

D. None of these

Answer: B

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21. A JEE aspirant estimates that she will be successful with an 80% chance if she studies 10 hours per day, with 60% chance if she studies 7 hourse per day, and with a 40% chance if she studies 4 hours per day. She further believes that she will study 10 houers, 7 hours, and 4 hours per day with probabilities $0.1, 0.2$ and 0.7, respectively.

The chance she will be successful is

A. 0.28

B. 0.38

C. 0.48

D. 0.58

Answer: C

Watch Video Solution

22. A JEE aspirant estimates that she will be successful with an 80 percent chance if she studies 10 hours per day, with a 60 percent chance if she studies 7 hours per day and with 40 percent chance if she studies 4 hours per day. She further believes that she will study 10 hours, 7 hours and 4 hours per day with probabilities 0.1, 0.2 and 0.7 respectively. Given that she is successful the chance she studied for 4hours is

A. $6/12$

B. $7/12$

C. $8/12$

D. $9/12$

Answer: B

Watch Video Solution

23. A JEE aspirant estimates that she will be successful with an 80 percent chance if she studies 10 hours per day, with a 60 percent chance if she studies 7 hours per day and with 40 percent chance if she studies 4 hours per day. She further believes that she will study 10 hours, 7 hours and 4 hours per day with probabilities 0.1, 0.2 and 0.7 respectively. Given that she does not achieving success ,the chance she studied for 4hours is:

A. $18/26$

B. $19/26$

C. $20/26$

D. $21/26$

Answer: D

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24. Let S and T are two events difined on a sample space with probabilities

$P(S) = 0.5, P(T) = 0.69, P(S/T) = 0.5$

Events S and T are

A. mutually exclusive

B. independent

C. Mutually exclusive and independent

D. neither mutually exclusive nor independent

Answer: B

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25. Let S and T are two events defined on a sample space with probabilities

$P(S) = 0.5, P(T) = 0.69, P(S/T) = 0.5$

The value of P(S and T) is

A. 0.3450

B. 0.2500

C. 0.6900

D. 0.350

Answer: A

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26. Let S and T are two events defined on a sample space with probabilities

$P(S) = 0.5, P(T) = 0.69, P(S/T) = 0.5$

The value of P(S and T) is

A. 0.3450

B. 0.2500

C. 0.6900

D. 0.350

Answer: A

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27. An amobeba either splits into two or remains the same or eventually dies out immediately after completion of evary second with probabilities, respectively, 1/2, 1/4 and 1/4. Let the initial amoeba be called as mother amoeba and after every second, the amoeba, if it is distinct from the previous one, be called as 2nd, 3rd,...generations.

The probability that immediatly after completion of 2 s all the amoeba population dies out is

A. $9/32$

B. $11/32$

C. $1/2$

D. $3/32$

Answer: D

Watch Video Solution

28. An amobeba either splits into two or remains the same or eventually dies out immediately after completion of evary second with probabilities, respectively, 1/2, 1/4 and 1/4. Let the initial amoeba be called as mother amoeba and after every second, the amoeba, if it is distinct from the previous one, be called as 2nd, 3rd,...generations.

The probability that amoeba population will be maximum after completion of 3 s is

A. $1/16$

B. $1/8$

C. $3/4$

D. $1/2$

Answer: B

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29. An amobeba either splits into two or remains the same or eventually dies out immediately after completion of evary second with probabilities, respectively, 1/2, 1/4 and 1/4. Let the initial amoeba be called as mother amoeba and after every second, the amoeba, if it is distinct from the previous one, be called as 2nd, 3rd,...generations.

The probability that amoeba population will be maximum after completion of 3 s is

A. $1/2^7$

B. $1/2^6$

C. $1/2^8$

D. None of these

Answer: A

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30. Two fair dice are rolled. Let $P(A_i) > 0$ donete the event that the sum of the faces of the dice is divisible by i.

Which one of the following events is most probable?

A. A_3

B. A_4

C. A_5

D. A_6

Answer: A

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31. Two fair dice are rolled. Let $P(A_i) > 0$ donete the event that the sum of the faces of the dice is divisible by i.

For which one of the following (I,j) are the events A_i and A_j independent ?

A. $(3, 4)$

B. $(4, 6)$

C. $(2, 3)$

D. $(4, 2)$

Answer: C

View Text Solution

32. Two fair dice are rolled. Let $P(A_i) > 0$ donete the event that the sum of the faces of the dice is divisible by i.

The number of all possible ordered pair (I,j) for which the events A_i and a_j are independent is

A. 6

B. 12

C. 13

D. 25

Answer: D

Watch Video Solution

33. A player tosses a coin and score one point for every head and two points for every tail that turns up. He plays on until his score reaches or passes n. P_n denotes the probability of getting a score of exactly n.

The value of $P(n)$ is equal to

A. $(1/2)\left[P_{n-1}+P_{n-2}\right]$

B. $(1/2)\left[2P_{n-1}+P_{n-2}\right]$

C. $(1/2)\left[P_{n-1}+2P_{n-2}\right]$

D. None of these

Answer: A

Watch Video Solution

34. A player tosses a coin and score one point for every head and two points for every tail that turns up. He plays on until his score reaches or passes n. P_n denotes the probability of getting a score of exactly n.

The value of $P(n)$ is equal to

A. $1/2$

B. $2/3$

C. 1

D. None of these

Answer: C

Watch Video Solution

35. A player tosses a coin and score one point for every head and two points for every tail that turns up. He plays on until his score reaches or passes n. P_n denotes the probability of getting a score of exactly n.

The value of $P(n)$ is equal to

A. $P_{100} > 2/3$

B. $P_{100} < 2/3$

C. $P_{100}, P_{101} > 2/3$

D. None of these

Answer: C

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Exercise (Matrix)

1. n whole numbers are randomly chosen and multiplied. Now, match the following lists.

List I	List II
a. The probability that the last digit is 1, 3, 7, or 9 is	p. $\frac{8^n - 4^n}{10^n}$
b. The probability that the last digit is 2, 4, 6, 8 is	q. $\frac{5^n - 4^n}{10^n}$
c. The probability that the last digit is 5 is	r. $\frac{4^n}{10^n}$
d. The probability that the last digit is zero is	s. $\frac{10^n - 8^n - 5^n + 4^n}{10^n}$

A. | a | b | c | d |
|---|---|---|---|
| q | s | s | r |

B. | a | b | c | d |
|---|---|---|---|
| r | q | q | p |

C. | a | b | c | d |
|---|---|---|---|
| q | p | p | s |

D. | a | b | c | d |
|---|---|---|---|
| q | s | p | r |

Answer: A::B::C::D

Watch Video Solution

2. Three distinct numbers a, b and c are chosen at random from the numbers 1, 2, ..., 100. The probability that

List I	List II
a. a, b, c are in AP is	p. $\frac{53}{161700}$
b. a, b, c are in GP is	q. $\frac{1}{66}$
c. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in GP is	r. $\frac{1}{22}$
d. a + b + c is divisible by 2 is	s. $\frac{1}{2}$

A. | a | b | c | d |
|---|---|---|---|
| q | s | s | r |

B.

a	b	c	d
r	q	q	p

C.

a	b	c	d
q	p	p	s

D.

a	b	c	d
q	s	p	r

Answer: C

Watch Video Solution

3. Evaluate $\int \frac{\cos x + x\sin x}{x^2 + x\cos x} dx$

Watch Video Solution

4. An urn contains r red balls and b black balls. Now, match the following lists:

Watch Video Solution

5. Let A and B are two independent events. Such that $P(A) = 1/3$ and $P(B) = 1/4$. Then match the following lists:

A. $q \quad s \quad s \quad r$

B. $q \quad r \quad s \quad r$

C. $q \quad s \quad r \quad p$

D. $r \quad s \quad p \quad q$

Answer: B

Watch Video Solution

6. Differentiate $y = \left(x - \cos^2 x\right)^4$

Watch Video Solution

7. Match the following lists:

Watch Video Solution

8. An urn contains r red balls and b black balls. Now, match the following lists:

Watch Video Solution

9. Let A and B are two independent events. Such that $P(A) = 1/3$ and $P(B) = 1/4$. Then match the following lists:

A. $q \quad s \quad s \quad r$

B. $q \quad r \quad s \quad r$

C. $q \quad s \quad r \quad p$

D. $r \quad s \quad p \quad q$

Answer: B

Watch Video Solution

10. A bag contains some white and some black balls, all combinations being equally likely. The total number of balls in the bag is 12. Four balls are drawn at random from the bag at random without replacement.

A. $q \quad s \quad s \quad r$

B. $r \quad s \quad q \quad p$

C. $q \quad s \quad r \quad p$

D. $q \quad p \quad r \quad q$

Answer: D

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Exercise (Numerical)

1. If the probability of a six digit number N whose six digit are 1,2,3,4,5,6 written as random order is divisible by 6 is p, then the value of $1/p$ is________.

Watch Video Solution

2. If the probability that the product of the outcomes of three rolls of a fair dice is a prime number is p, then the value of $1/(4p)$ is____.

Watch Video Solution

3. There are two red, two blue, two white, and certain number (greater than 0) of green socks in a drawer. If two socks are taken at random from the drawer 4 without replacement, the probability that they are of the same color is $\frac{1}{5}$, then the number of green socks are _______.

Watch Video Solution

4. A dice is weighted such that the probability of rolling the face numbered n is proportional to n^2 (n = 1, 2, 3, 4, 5, 6). The dice is rolled twice, yielding the number a and b. The probability that $a > b$ is p then the value of $[2/p]$ (where [.] represents greatest integer function) is ______.

Watch Video Solution

5. In a knockout tournament 2^n equally skilled players, S_1, S_2, S_{2n} are participating. In each round, players are divided in pair at random and winner form each pair moves in the next round. If S_2 reaches the semi-final, then the probability that S_1 wins the tournament is 1/84. The value of n equals________.

Watch Video Solution

6. Five different games are to be distributed among 4 children randomly. The probability that each child get at least one game is $1/4$ b. $15/64$ c. $5/9$ d. $7/12$

Watch Video Solution

7. A bag contains 10 different balls. Five balls are drawn simultaneously and then replaced and then seven balls are drawn. The probability that exactly three balls are common to the tow draw on is p, then the value of $12p$ is _____.

Watch Video Solution

8. If tow loaded dice each have the property that 2 or 4 is three times as likely to appear as 1, 3, 5, or 6 on each roll. When two such dice are rolled, the probability of obtaining a total of 7 is p, then the value of$[1/p]$ is, where $[x]$ represents the greatest integer less than or equal to x

Watch Video Solution

9. An urn contains three red balls and n white balls. Mr. A draws two balls together from the urn. The probability that they have the same color is $1/2$. Mr.B draws one ball from the urn, notes its color and rplaces it. He then draws a second ball from the urn and finds that both balls have the same color is $5/8$. The value of n is ___.

Watch Video Solution

10. Suppose A and B are two events with $P(A) = 0.5$ and P(AuuB)=0.8LetP(B)=p` if A and B are mutually exclusive and P(B)=q if A and B are independent events, then value of q/p is ___.

Watch Video Solution

11. Thirty-two players ranked 1 to 32 are playing in a knockout tournament. Assume that in every match between any two players the better ranked player wins, the probability that ranked 1 and ranked 2 players are winner and runner up respectively is p, then the value of $[2/p]$ is, where [.] represents the greatest integer function,____.

Watch Video Solution

12. If $AandB$ are two events such that $P(A) = 0.6$ and $P(B) = 0.8$, if the greatest value that $P(A/B)$ can have is p, then the value of $8p$ is _______.

Watch Video Solution

13. A die is thrown three times. The chance that the highest number shown on the die is 4 is p, then the value of $[1/p]$ is where [.] represents greatest integer function is ________.

Watch Video Solution

14. Two cards are drawn from a well shuffled pack of 52 cards. The probability that one is heard card and the other is a king is p, then the value of 104p is____.

Watch Video Solution

15. Find the derivative of $y = 2\sin^3\left(x^4\right)$.

Watch Video Solution

16. An unbiased normal coin is tossed n times. Let

E_1: event that both heads and tails are present in n tosses.

E_2: event that the coin shows up heads at most once.

The value of n for which E_1 and E_2 are independent is ______.

Watch Video Solution

17. In a knockout tournament 2^n equally skilled players, S_1, S_2, S_{2n} are participating. In each round, players are divided in pair at random and winner form each pair moves in the next round. If S_2 reaches the semi-final, then the probability that S_1 wins the tournament is 1/84. The value of n equals________.

Watch Video Solution

18. If tow loaded dice each have the property that 2 or 4 is three times as likely to appear as 1, 3, 5, or 6 on each roll. When two such dice are rolled, the probability of obtaining a total of 7 is p, then the value of$[1/p]$ is, where $[x]$ represents the greatest integer less than or equal to x

Watch Video Solution

19. An urn contains three red balls and n white balls. Mr. A draws two balls together from the urn. The probability that they have the same color is $1/2$. Mr.B draws one ball from the urn, notes its color and rplaces it. He then draws a second ball from the urn and finds that both balls have the same color is $5/8$. The value of n is ___.

Watch Video Solution

20. Suppose $A and B$ are two events with $P(A) = 0.5 and P(A \cup B) = 0.8$. Let $P(B) = p$ if $A and B$ are mutually exclusive and $P(B) = q$ if $A and B$ are independent events, then the value of q/p is_______.

Watch Video Solution

21. Thirty-two players ranked 1 to 32 are playing in a knockout tournament. Assume that in every match between any two players the better ranked player wins, the probability that ranked 1 and ranked 2 players are winner and runner up respectively is p, then the value of $[2/p]$ is, where [.] represents the greatest integer function,____.

Watch Video Solution

22. If $A and B$ are two events such that $P(A) = 0.6$ and $P(B) = 0.8$, if the greatest value that $P(A/B)$ can have is p, then the value of $8p$ is ______.

Watch Video Solution

23. A die is thrown three times. The chance that the highest number shown on the die is 4 is p, then the value of $[1/p]$ is where [.] represents greatest integer function is _______.

Watch Video Solution

24. Two cards are drawn from a well shuffled pack of 52 cards. The probability that one is heart card and the other is a king is p, then the value of 104p is___.

Watch Video Solution

25. A fair coin is flipped n times. Let E be the event "a head is obtained on the first flip" and let F_k be the event "exactly k heads are obtained". Then the value of n/k for which E and F_k are independent is ____.

Watch Video Solution

26. An unbiased normal coin is tossed n times. Let

E_1: event that both heads and tails are present in n tosses.

E_2: event that the coin shows up heads at most once.

The value of n for which E_1 and E_2 are independent is _____.

Watch Video Solution

27. In a knockout tournament 2^n equally skilled players, $S_1, S_2, \dots. S_{2n},$ are participatingl. In each round, players are divided in pair at random and winner from each pair moves in the next round. If S_2 reaches the semi-final, then the probability that S_1 wins the tournament is 1/84. The value of n equals ______.

View Text Solution

JEE Main Previous Year

1. Four numbers are chosen at random (without replacement) from the set {1, 2, 3, ..., 20}. Statement-1: The probability that the chosen numbers when arranged in some order will form an AP Is $\frac{1}{85}$. Statement-2: If the four chosen numbers from an AP, then the set of all possible values of common difference is {1, 2, 3, 4, 5}. (1) Statement-1 is true, Statement-2 is true; Statement-2 is not the correct explanation for Statement-1 (2) Statement-1 is true, Statement-2 is false (3) Statement-1 is false, Statement-2 is true (4) Statement-1 is true, Statement-2 is true; Statement-2 is the correct explanation for Statement-1

A. Statement 1 is false, statement 2 is true.

B. Statement 1 is true, statement 2 is true, statement 2 is a correct explanation for statement 1.

C. Statement 1 is true, statement 2 is true, statement 2 is not a correct explanation for statement 2.

D. Statement 1 is true, statement 2 is false.

Answer: D

Watch Video Solution

2. An urn contains nine balls of which three are red, four are blue and two are green. Three balls are drawn at random without replacement from the urn. The probability that the three balls have different colour is

A. $\frac{2}{23}$

B. $\frac{1}{3}$

C. $\frac{2}{7}$

D. $\frac{1}{21}$

Answer: C

Watch Video Solution

3. If two different numbers are taken from the set $\{0, 1, 2, 3, , 10\}$; then the probability that their sum as well absolute difference are both multiple of 4, is: $\frac{14}{45}$ (2) $\frac{7}{55}$ (3) $\frac{6}{55}$ (4) $\frac{12}{55}$

A. $\frac{7}{55}$

B. $\frac{6}{55}$

C. $\frac{12}{55}$

D. $\frac{14}{45}$

Answer: B

Watch Video Solution

4. For three events A, B and C, P (Exactly one of A or B occurs) $= P$ (Exactly one of B or C occurs) $= P$ (Exactly one of C or A occurs) $= \frac{1}{4}$ and

P (All the three events occur simultaneously) $= \frac{1}{16}$. Then the probability that at least one of the events occurs, is :

A. $\frac{3}{16}$

B. $\frac{7}{32}$

C. $\frac{7}{16}$

D. $\frac{7}{64}$

Answer: C

Watch Video Solution

5. One ticket is selected at random from 100 tickets numbered 00,01,02,...,98,99. Suppose S and T are the sum and product of the digits of the number on the ticket, then the probability of getting S=9 and T=0 is $2/19$ b. $19/100$ c. $1/50$ d. none of these

A. $\frac{1}{14}$

B. $\frac{1}{7}$

C. $\frac{5}{14}$

D. $\frac{1}{50}$

Answer: A

Watch Video Solution

6. In a binomial distribution $B(b, p = 1/4)$, if the probability of at least one success is greater than or equal to $9/10$, then n is greater than

A. $\frac{1}{\log_{10}4 - \log_{10}3}$

B. $\frac{1}{\log_{10}4 + \log_{10}3}$

C. $\frac{9}{\log_{10}4 - \log_{10}3}$

D. $\frac{4}{\log_{10}4 - \log_{10}3}$

Answer: A

Watch Video Solution

7. Consider 5 independent Bernoulli.s trials each with probability of success p. If the probability of at least one failure is greater than or equal to $\frac{31}{32}$, then p lies in the interval : (1) $\left(\frac{1}{2}, \frac{3}{4}\right]$ (2) $\left(\frac{3}{4}, \frac{11}{12}\right]$ (3) $\left[0, \frac{1}{2}\right]$ (4) $\left(\frac{11}{12}, 1\right]$

A. $\left(\frac{11}{12}, 1\right]$

B. $\left(\frac{1}{2}, \frac{3}{4}\right]$

C. $\left(\frac{3}{4}, \frac{11}{12}\right]$

D. $\left[0, \frac{1}{2}\right]$

Answer: D

Watch Video Solution

8. If C and D are two events such that $C \subset D$and P(D) ≠ 0,` then the correct statement among the following is

A. $P(C \mid D) = \frac{P(D)}{P(D)}$

B. $P(C \mid D) = P(C)$

C. $P(C \mid D) \geq P(C)$

D. $P(C \mid D) < P(C)$

Answer: C

Watch Video Solution

9. Three numbers are chosen at random without replacement from {1, 2, 3, ... 8}. The probability that their minimum is 3, given that their maximum is 6, is (1) $\frac{3}{8}$ (2) $\frac{1}{5}$ (3) $\frac{1}{4}$ (4) $\frac{2}{5}$

A. $\frac{3}{8}$

B. $\frac{1}{5}$

C. $\frac{1}{4}$

D. $\frac{2}{5}$

Answer: B

Watch Video Solution

10. A multiple choice examination has 5 questions. Each question has three alternative answers of which exactly one is correct. The probability that a student will get 4 or more correct answers just guessing is

A. $\frac{17}{3^5}$

B. $\frac{13}{3^5}$

C. $\frac{11}{3^5}$

D. $\frac{10}{3^5}$

Answer: C

Watch Video Solution

11. Let A and B be two events such that $P\left(\overline{A \cup B}\right) = \frac{1}{6}, P(A \cap B) = \frac{1}{4}$ and $P\left(\bar{A}\right) = \frac{1}{4}$, $where \bar{A}$ stands for the complement of the event A. Then the events A and B are

A. mutually exclusive and independent

B. equally likely but not independent

C. Independent but not equally likely

D. independent and equally likely

Answer: C

Watch Video Solution

12. Twelve balls are distribute among three boxes. The probability that the first box contains three balls is a. $\frac{110}{9}\left(\frac{2}{3}\right)^{10}$ b. $\frac{9}{110}\left(\frac{2}{3}\right)^{10}$ c. $\frac{(12)C_3}{12^3} \times 2^9$ d. $\frac{(12)C_3}{3^{12}}$

A. $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

B. $55\left(\frac{2}{3}\right)^{10}$

C. $220\left(\frac{1}{3}\right)^{12}$

D. $22\left(\frac{1}{3}\right)^{11}$

Answer: A

Watch Video Solution

13. Let two fari six-faced dice A and B be thrown simltaneously. If E_1 is the event that die A shows up four, E_2 is the event that die B shows up two and E_3 is the event that the sum of numbers on both dice isodd, then which of the following statement is NOT True ?

A. E_2 and E_3 are independent

B. E_1 and E_3 are independent

C. E_1 and E_2 and E_3 are independent

D. E_1 and E_2 are independent

Answer: C

View Text Solution

14. A box contains 15 green and 10 yellow balls. If 10 balls are randomly drawn, one-nyne, with replacement, then the variance of the number of green balls drawn is

A. $\frac{6}{25}$

B. $\frac{12}{5}$

C. 6

D. 4

Answer: B

Watch Video Solution

15. A bag contains 4 red and 6 black balls. A ball is drawn at random from the bag, its colour is observed and this ball along with two additional balls of the same colour are returned to the bag. If now a ball is drawn at random from the bag, then the probability that this drawn ball is red, is

A. $3/4$

B. $3/10$

C. $2/5$

D. $1/5$

Answer: C

Watch Video Solution

16. One ticket is selected at random from 50 tickets numbered 00, 01, 02, ... , 49. Then the probability that the sum of the digits on the selected ticket is 8, given that the product of these digits is zero, equals (1) 1/14 (2) 1/7 (3) 5/14 (4) 1/50

A. $\frac{1}{14}$

B. $\frac{1}{7}$

C. $\frac{5}{14}$

D. $\frac{1}{50}$

Answer: A

Watch Video Solution

17. In a binomial distribution $B(b, p = 1/4)$, if the probability of at least one success is greater than or equal to $9/10$, then n is greater than

A. $\frac{1}{\log_{10}4 - \log_{10}3}$

B. $\frac{1}{\log_{10}4 + \log_{10}3}$

C. $\frac{9}{\log_{10}4 - \log_{10}3}$

D. $\frac{4}{\log_{10}4 - \log_{10}3}$

Answer: A

Watch Video Solution

18. Consider 5 independent Bernoulli's trials each with probability of at least one failure is greater than or equal to $\frac{31}{32}$, then p lies in the interval

A. $\left(\frac{11}{12}, 1\right]$

B. $\left(\frac{1}{2}, \frac{3}{4}\right]$

C. $\left(\frac{3}{4}, \frac{11}{12}\right]$

D. $\left[0, \frac{1}{2}\right]$

Answer: D

Watch Video Solution

19. If C and D are two events such that $C \subset D$and P(D) ≠ 0,` then the correct statement among the following is

A. $P(C \mid D) = \frac{P(D)}{P(D)}$

B. $P(C \mid D) = P(C)$

C. $P(C \mid D) \geq P(C)$

D. $P(C \mid D) < P(C)$

Answer: C

Watch Video Solution

20. Three numbers are chosen at random without replacement from $\{1, 2, 3, \ldots, 8\}$. The probability that their minimum is 3, given that maximum is 6, is:

A. $\frac{3}{8}$

B. $\frac{1}{5}$

C. $\frac{1}{4}$

D. $\frac{2}{5}$

Answer: B

Watch Video Solution

21. A multiple choice examination has 5 questions. Each question has three alternative answers of which exactly one is correct. The probability that a student will get 4 or more correct answers just guessing is

A. $\frac{17}{3^5}$

B. $\frac{13}{3^5}$

C. $\frac{11}{3^5}$

D. $\frac{10}{3^5}$

Answer: C

Watch Video Solution

22. Let A and B be two events such that $P\left(\overline{A \cup B}\right) = \frac{1}{6}, P(A \cap B) = \frac{1}{4}$ and $P\left(\bar{A}\right) = \frac{1}{4}$, where $\bar{A}$ stands for the complement of the event A. Then the events A and B are

A. mutually exclusive and independent

B. equally likely but not independent

C. Independent but not equally likely

D. independent and equally likely

Answer: C

Watch Video Solution

23. If 12 identical balls are to be placed in 3 identical boxes, then the probability that one of the boxes contains exactly 3 balls is : (1) $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

(2) $55\left(\frac{2}{3}\right)^{10}$ (3) $220\left(\frac{1}{3}\right)^{12}$ (4) $22\left(\frac{1}{3}\right)^{11}$

A. $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

B. $55\left(\frac{2}{3}\right)^{10}$

C. $220\left(\frac{1}{3}\right)^{12}$

D. $22\left(\frac{1}{3}\right)^{11}$

Answer: A

Watch Video Solution

24. Let two fair six-faced dice A and B be thrown simultaneously. If E_1 is the event that die A shows up four, E_2 is the event that die B shows up two and E_3 is the event that the sum of numbers on both dice is odd, then which of the following statements is NOT true ? (1) E_1 and E_2 are independent. (2) E_2 and E_3 are independent. (3) E_1 and E_3 are independent. (4) E_1, E_2 and E_3 are independent.

A. E_2 and E_3 are independent

B. E_1 and E_3 are independent

C. E_1 and E_2 and E_3 are independent

D. E_1 and E_2 are independent

Answer: C

Watch Video Solution

25. A box contains 15 green and 10 yellow balls. If 10 balls are randomly drawn, one-by-one, with replacement, then the variance of the number of green balls drawn is

A. $\frac{6}{25}$

B. $\frac{12}{5}$

C. 6

D. 4

Answer: B

Watch Video Solution

26. A bag contains 4 red and 6 black balls. A ball is drawn at random from the bag, its colour is observed and this ball along with two additional balls of the same colour are returned to the bag. If now a ball is drawn at random from the bag, then the probability that this drawn ball is red, is

A. $3/4$

B. $3/10$

C. $2/5$

D. $1/5$

Answer: C

Watch Video Solution

JEE Advanced Previous Year

1. Let ω be a complex cube root unity with $\omega \neq 1$. A fair die is thrown three times. If $r_1, r_2 and r_3$ are the numbers obtained on the die, then the probability that $\omega^{r1} + \omega^{r2} + \omega^{r3} = 0$ is $1/18$ b. $1/9$ c. $2/9$ d. $1/36$

A. $1/18$

B. $1/9$

C. $2/9$

D. $1/36$

Answer: C

Watch Video Solution

2. Three boys and two girls stand in a queue. The probability, that the number of boys ahead is at least one more than the number of girls ahead of her, is `

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{3}{4}$

Answer: A

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3. Three randomly chosen nonnegative integers $x, yandz$ are found to satisfy the equation $x + y + z = 10$. Then the probability that z is even, is: $\frac{5}{12}$ (b) $\frac{1}{2}$ (c) $\frac{6}{11}$ (d) $\frac{36}{55}$

A. $\frac{1}{2}$

B. $\frac{36}{55}$

C. $\frac{6}{11}$

D. $\frac{5}{11}$

Answer: C

Watch Video Solution

4. Box 1 contains three cards bearing numbers, 1, 2, 3, box 2 contains five cards bearing number 1, 2, 3, 4, 5, and box 3 contains seven cards bearing numbers 1, 2, 3, 4, 5, 6, 7. A card is drawn from each of the boxes. Let x_i be the number on the card drawn from the i^{th} box, i = 1, 2, 3.

The probability that x_1, x_2, x_3 are in the arithmetic progression, is

A. $\frac{29}{105}$

B. $\frac{53}{105}$

C. $\frac{57}{105}$

D. $\frac{1}{2}$

Answer: B

Watch Video Solution

5. Box 1 contains three cards bearing numbers 1, 2, 3; box 2 contains five cards bearing numbers 1, 2, 3,4, 5; and box 3 contains seven cards bearing numbers 1, 2, 3, 4, 5, 6, 7. A card is drawn from each of the boxes. Let x_i be the number on the card drawn from the ith box, i = 1, 2, 3. The probability that $x_1 + x_2 + x_3$ is odd is The probability that x_1, x_2, x_3 are in an aritmetic progression is

A. $\frac{9}{105}$

B. $\frac{10}{105}$

C. $\frac{11}{105}$

D. $\frac{7}{105}$

Answer: C

Watch Video Solution

6. PARAGRAPH A There are five students $S_1,\ S_2,\ S_3,\ S_4$ and S_5 in a music class and for them there are five seats $R_1,\ R_2,\ R_3,\ R_4$ and R_5 arranged in a row, where initially the seat R_i is allotted to the student S_i, $i = 1, 2, 3, 4, 5$. But, on the examination day, the five students are randomly allotted five seats. (For Ques. No. 17 and 18) The probability that, on the examination day, the student S_1 gets the previously allotted seat R_1, and NONE of the remaining students gets the seat previously allotted to him/her is $\frac{3}{40}$ (b) $\frac{1}{8}$ (c) $\frac{7}{40}$ (d) $\frac{1}{5}$

A. $\frac{3}{40}$

B. $\frac{1}{8}$

C. $\frac{7}{40}$

D. $\frac{1}{5}$

Answer: A

Watch Video Solution

7. There are five students S_1, S_2, S_3, S_4 and S_5 in a music class and for them there are five seats R_1, R_2, R_3, R_4 and R_5 arranged in a row, where initially the seat R_i is allotted to the student S_i, i = 1, 2, 3, 4, 5. But, on the examination day, the five students are randomly allotted the five seats.

The probability that, on the examination day, the student S_1 gets the previously allotted seat R_1, and NONE of the remaining students gets the seat previously allotted to him/her, is

A. $\frac{1}{15}$

B. $\frac{1}{10}$

C. $\frac{7}{60}$

D. $\frac{1}{5}$

Answer: C

Watch Video Solution

8. A signal which can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then and 3 transmitted to station B. The probability of each station receiving the signal correctly is

$\frac{3}{4}$ If the signal received at station B is green, then the probability that the original signal was green is (a) $\frac{3}{5}$ (b) $\frac{6}{7}$ (c) $\frac{20}{23}$ (d) $\frac{9}{20}$

A. $\frac{3}{5}$

B. $\frac{6}{7}$

C. $\frac{20}{23}$

D. $\frac{9}{20}$

Answer: C

Watch Video Solution

9. Four persons independently solve a certain problem correctly with proabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then the probability that the problem is solved correctly by at least one of them is

A. $\frac{235}{256}$

B. $\frac{21}{256}$

C. $\frac{3}{256}$

D. $\frac{253}{256}$

Answer: A

Watch Video Solution

10. A computer producing factory has only two plants T_1 and T_2. Plant T_1 produces 20% and plant T_2 produces 80% of the total computers produced in the factory turn out to be defective. It is known that P (computer turns out to be defective givent that it is produced in plant T_1) = 10 P (computer turns out to be defective given that it is produced in plant T_2), where P (E) denotes the probability of an event E. A computer produced in the factory is randomly selected and it does not turn out to be defective. Then the probability that it is produced in plant T_2 is

A. $\frac{36}{73}$

B. $\frac{47}{79}$

C. $\frac{78}{96}$

D. $\frac{75}{83}$

Answer: C

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11. Let E and F be two independent events. The probability that exactly one of them occurs is $11/25$ and the probability of none of them occurring is $2/25$. If P(T) denotes the probability of occurrence of the event T, then

A. $P(E) = \frac{4}{5}, P(F) = \frac{3}{5}$

B. $P(E) = \frac{1}{5}, P(F) = \frac{2}{5}$

C. $P(E) = \frac{2}{5}, P(F) = \frac{1}{5}$

D. $P(E) = \frac{3}{5}, P(F) = \frac{4}{5}$

Answer: A::D

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12. A ship is fitted with three engines $E_1, E_2,$ and E_3 the engines function independently of each othe with respectively probability $1/2, 1/4,$ and $1/4.$ For the ship to be operational at least two of its engines must function. Let X denote the event that the ship is operational and let $X_1, X_2,$ and X_3 denote, respectively, the events that the engines $E_1, E_2,$ and E_3 are functioning. Which of the following is (are) true?

A. $P\left(X_1^C / X\right) = \frac{3}{16}$

B. P (exactly two engines of the ship are functioning X $= \frac{7}{8}$

C. $P\left(X \mid X_1\right) = \frac{5}{16}$

D. $P\left(X \mid X_1\right) = \frac{7}{16}$

Answer: B::D

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13. Let X and Y be two events such that $P(X) = \frac{1}{3}, P(X \mid Y) = \frac{1}{2}$ and $P(Y \mid X) = \frac{2}{5}$. Then

A. $P(Y) = \frac{4}{15}$

B. $P(X' \mid Y) = \frac{1}{2}$

C. $P(X \cup Y) = \frac{2}{5}$

D. $P(X \cap Y) = \frac{1}{5}$

Answer: A::B

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14. A signal which can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then and 3 transmitted to station B. The probability of each station receiving the signal correctly is $\frac{3}{4}$ If the signal received at station B is green, then the probability that the original signal was green is (a) $\frac{3}{5}$ (b) $\frac{6}{7}$ (c) $\frac{20}{23}$ (d) $\frac{9}{20}$

A. $\frac{3}{5}$

B. $\frac{6}{7}$

C. $\frac{20}{23}$

D. $\frac{9}{20}$

Answer: C

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15. Four persons independently solve a certain problem correctly with proabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then the probability that the problem is solved correctly by at least one of them is

A. $\frac{235}{256}$

B. $\frac{21}{256}$

C. $\frac{3}{256}$

D. $\frac{253}{256}$

Answer: A

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16. A computer producing factory has only two plants T_1 and T_2. Plant T_1 produces 20% and plant T_2 produces 80% of the total computers produced. 7% of computers produced in the factory turn out to be defective. It is known that P(computer turns out to bedefective, given that it is produced in plant T_1)=10P (computer turns out to be defective, given that it is produced in plant T_2), where P(E) denotes the probability of an event E.A computer produced in the factory is randomly selected and it does not turn out to be defective. Then, the probability that it is produced in plant T_2, is

A. $\frac{36}{73}$

B. $\frac{47}{79}$

C. $\frac{78}{96}$

D. $\frac{75}{83}$

Answer: C

Watch Video Solution

17. Let E and F be two independent events. The probability that exactly one of them occurs is $11/25$ and the probability of none of them occurring is $2/25$. If P(T) denotes the probability of occurrence of the event T, then

A. $P(E) = \frac{4}{5}, P(F) = \frac{3}{5}$

B. $P(E) = \frac{1}{5}, P(F) = \frac{2}{5}$

C. $P(E) = \frac{2}{5}, P(F) = \frac{1}{5}$

D. $P(E) = \frac{3}{5}, P(F) = \frac{4}{5}$

Answer: A::D

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18. A ship is fitted with three engines $E_1, E_2,$ and E_3 the engines function independently of each othe with respectively probability $1/2, 1/4,$ and $1/4.$ For the ship to be operational at least two of its engines must function. Let X denote the event that the ship is operational and let $X_1, X_2,$ and X_3 denote, respectively, the events that the engines $E_1, E_2,$ and E_3 are functioning. Which of the following is (are) true?

A. $P\left(X_1^C / X\right) = \frac{3}{16}$

B. P (exactly two engines of the ship are functioning X $= \frac{7}{8}$

C. $P\left(X \mid X_1\right) = \frac{5}{16}$

D. $P\left(X \mid X_1\right) = \frac{7}{16}$

Answer: B::D

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19. Let X and Y be two events such that $P(X) = \frac{1}{3}, P(X \mid Y) = \frac{1}{2}$ and $P(Y \mid X) = \frac{2}{5}$. Then

A. $P(Y) = \frac{4}{15}$

B. $P(X' \mid Y) = \frac{1}{2}$

C. $P(X \cup Y) = \frac{2}{5}$

D. $P(X \cap Y) = \frac{1}{5}$

Answer: A::B

Watch Video Solution

20. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses required.

The probability that $X = 3$ equals

A. $25/216$

B. $25/36$

C. $5/36$

D. $125/216$

Answer: A

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21. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses rerquired.

The probability that $X = \ \geq 3$ equals

A. $125/216$

B. $25/36$

C. $5/36$

D. $25/216$

Answer: B

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22. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses rerquired.

The probability that $X = \ \geq 3$ equals

A. $125/216$

B. $25/36$

C. $5/36$

D. $25/216$

Answer: D

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23. Let U_1 , and U_2, be two urns such that U_1, contains 3 white and 2 red balls, and U_2, contains only1 white ball. A fair coin is tossed. If head appears then 1 ball is drawn at random from U_1, and put into U_2, . However, if tail appears then 2 balls are drawn at random from U_1, and put into U_2. . Now 1 ball is drawn at random from U_2, . The probability of the drawn ball from U_2, being white is

A. $\frac{13}{30}$

B. $\frac{23}{30}$

C. $\frac{19}{30}$

D. $\frac{11}{30}$

Answer: B

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24. Given that the drawn ball from U2 is white, the probability that head appeared on the coin

A. $\frac{17}{23}$

B. $\frac{11}{23}$

C. $\frac{15}{23}$

D. $\frac{12}{23}$

Answer: D

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25. A box B_1 contains 1 white ball, 3 red balls, and 2 black balls. An- other box B_2 contains 2 white balls, 3 red balls and 4 black balls. A third box B_3 contains 3 white balls, 4 red balls, and 5 black balls.

If 1 ball is drawn from each of the boxes B_1, B_2 and B_3, the probability that all 3 drawn balls are of the same color is

A. $82/648$

B. $90/648$

C. $558/648$

D. $566/648$

Answer: A

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26. A box B_1 contains 1 white ball, 3 red balls, and 2 black balls. An- other box B_2 contains 2 white balls, 3 red balls and 4 black balls. A third box B_3 contains 3 white balls, 4 red balls, and 5 black balls.

If 2 balls are drawn (without replecement) from a randomly selected box and one of the balls is white and the other ball is red the probability that these 2 balls are drawn from box B_2 is

A. $116/182$

B. $126/181$

C. $65/181$

D. $55/181$

Answer: D

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27. Let n_1 and n_2 be the number of red and black balls, respectively, in box I. Let n_3 and n_4 be the numbers of red and black balls, respectively, in the box II.

A ball is drawn at random from box I and transferred to box II. If the probability of drawing a red ball from box I, after this transfer, is 1/3, then the correct options (s) with the possible values of n_1 and n_2 is (are)

A. $n_1 = 3, n_2 = 3, n_3 = 5, n_4 = 15$

B. $n_1 = 3, n_2 = 6, n_3 = 10, n_4 = 50$

C. $n_1 = 8, n_2 = 6, n_3 = 5, n_4 = 20$

D. $n_1 = 6, n_2 = 12, n_3 = 5, n_4 = 20$

Answer: A::B

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28. Let n_1 and n_2 be the number of red and black balls, respectively, in box I. Let n_3 and n_4 be the numbers of red and black balls, respectively, in the box II.

A ball is drawn at random from box I and transferred to box II. If the probability of drawing a red ball from box I, after this transfer, is 1/3, then the correct options (s) with the possible values of n_1 and n_2 is (are)

A. $n_1 = 4$ and $n_2 = 6$

B. $n_1 = 2$ and $n_2 = 3$

C. $n_1 = 10$ and $n_2 = 20$

D. $n_1 = 3$ and $n_2 = 6$

Answer: C::D

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29. Football teams T_1 and T_2 have to play two games are independent. The probabilities of T_1 winning, drawing and lossing a game against T_2 are $\frac{1}{2}, \frac{1}{6}$ and $\frac{1}{3}$, respectively. Each team gets 3 points for a win, 1 point for a draw and 0 point for a loss in a game. Let X and Y denote the total points scored by teams T_1 and T_2 respectively, after two games.

$P(X > Y)$ is

A. $\frac{1}{4}$

B. $\frac{5}{12}$

C. $\frac{1}{2}$

D. $\frac{7}{12}$

Answer: B

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30. Football teams T_1 and T_2 have to play two games are independent. The probabilities of T_1 winning, drawing and lossing a game against T_2 are $\frac{1}{6}, \frac{1}{6}$ and $\frac{1}{3}$, respectively. Each team gets 3 points for a win, 1 point for a draw and 0 point for a loss in a game. Let X and Y denote the total points scored by teams T_1 and T_2 respectively, after two games.

$P(X = Y)$ is

A. $\frac{11}{36}$

B. $\frac{1}{3}$

C. $\frac{13}{36}$

D. $\frac{1}{2}$

Answer: C

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31. Of the three independent event E_1, E_2 and E_3, the probability that only E_1 occurs is α, only E_2 occurs is β and only E_3 occurs is γ. If the probavvility p that none of events E_1, E_2 or E_3 occurs satisfy the equations $(\alpha - 2\beta)p = \alpha\beta$ and $(\beta - 3\gamma)p = 2\beta\gamma$. All the given probabilities are assumed to lie in the interval (0, 1). Then, $\frac{\text{probability of occurrence of } E_1}{\text{probability of occurrence of } E_3}$ is equal to

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Exercise 14.1

1. Three coins are tossed. If one of them shows tail, then find the probability that all three coins show tail.

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2. If two events A and B are such that $P(A') = 0.3, P(B) = 0.4$ and $P(A \cap B') = 0.5,$ then find the value of $P[B / A \cup B')]$.

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3. In a single throw of two dice what is the probability of obtaining a number greater , if 4 appears on the first dice?

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4. A coin is tossed three times in succession. If E is the event that there are at least two heads and F is the event in which first throw is a head, then find $P(E/F)$.

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5. Consider a sample space S representing the adults in a small town who have completed the requirements for a college degree. They have been categorized according to sex and employment as follows: , Employed, Unemployed Male, 460, 40 Female, 140, 260 An employed person is selected at random. Find the probability that the chosen one is a male.

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6. A binary number is made up to 8 digits. Suppose that the probability if an incorrect digit appearing is p and that the errors in different digits are independent of each other. Then find the probability of forming an incorrect number.

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7. The probability of India winning a test match against West Indies is 1/2. Assuming independence from match to match, find the probability that in a match series Indias second win occurs at the third test.

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9. A bag contains a white and b black balls. Two players, $AandB$ alternately draw a ball from the bag, replacing the ball each time after the draw till one of them draws a white ball and wins the game. A begins the game. If the probability of A winning the game is three times that of $B,$ then find the ratio $a:b$

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Exercise 14.2

1. A bag contains 5 white and 3 black balls. Five balls are drawn successively without replacement. The probability that they are alternately of different colours is

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2. Cards are drawn one at random from a well shuffled full pack of 52 playing cards until 2 aces are obtained for the first time. If N is the number of cards required to the drawn, then show that `P ,{N=n}=((n-1)(52-n)(51-n))/(50xx49xx17xx13),w h e r e2

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3. In a multiple choice question, there are four alternative answers of which one or more than one is correct A candidate will get marks on the question only if he ticks the correct answer. The candidate decides to tick answers at a random. If he is allowed up to three chances to answer the question, then find the probability that he will get marks on it.

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Exercise 14.3

1. A coin is tossed three times.

Event A: two heads appear

Event B: last should be head

Then identify whether events A and B are independent or not.

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2. If A and B are two events such that $P(A) = \frac{1}{2}, P(B) = \frac{7}{12}$ and P(not A or not B) = $\frac{1}{4}$. State whether A and B are independent?

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3. Two cards are drawn one by one randomly from a pack of 52 cards. Then find the probability that both of them are king.

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4. The probability of happening an event A in one trial is 0.4. Find the probability that the event A happens at least one in three independent trials.

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5. In a bag there are 6 balls of which 3 are white and 3 are black. They are drwn successively with replacement. What is the chance that the colours are alternate ?

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6. A man performs 10 trials of an experiment, if the probability of getting '4 sucesses' is maximum, then find the probability of failure in each trial.

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7. A man and a woman appear in an interview for two vacancies in the same post. The probability of mans selection of 1/4 and that the womans selection is 1/3. What is the probability that none of them will be selected?

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8. The probability that Krishna will be alive 10 years hence is 7/15 and that Hari will be alive is 7/10. What is t he probability that both Krishna and Hari will be dead 10 years hence?

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Exercise 14.4

1. An urn contains 5 red and 5 black balls. A ball is draw at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls of the colour drawn are put in the urn and then a ball is drawn at random. What is the probability that the second ball is red?

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2. A bag contains 3 white, 3 black and 2 red balls. One by one, three balls are drawn without replacing them. Find the probability that the third ball is red.

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3. Two thirds of the students in a class are boys and the rest girls. It is known that eh probability of a girl getting a first class is 0.25 and that of a boy getting a first class is 0.28. find the probability that a student chosen at random will get first class marks in the subject.

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4. A composite number is selected at random from the first 30 natural numbers and it is divided by 5. The probability that there will be a remainder is

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5. A real estate man has eight master keys to open several new homes. Only one master key will open any given hour. If 40% of these homes are usually left unlocked, what is the probability that the real estate man can get into a specific home if he selects three master keys at random before leaving the office?

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6. An urn contains m white and n black balls. A ball is drawn at random and is put back into the urn along with k balls of the same colour as that of the ball drawn. a ball is again drawn at random. Show that the probability of drawing a white ball now does not depend on k.

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7. A box contains 12 red and 6 white balls. Balls are drawn from the bag one at a time without replacement. If in 6 draws, there are at least 4 white balls, find the probability that exactly one white ball is drawn in the next two draws. (Binomial coefficients can be left as such).

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Exercise 14.5

1. A card from a pack of 52 cards is lost. From the remaining cards of the pack; two cards are drawn and are found to be hearts. Find the probability of the missing card to be a heart.

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2. There are three coins. One is a two headed coin (having head on both faces), another is a biased coin that comes up heads 75% of the time and third is an unbiased coin. One of the three coins is chosen at random and tossed, it shows heads, what i

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3. Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a appears. The probability that actually there was head is (A) $\frac{4}{5}$ (B) $\frac{1}{2}$ (C) $\frac{1}{5}$ (D) $\frac{2}{5}$

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4. An urn contains 4 balls. Two balls are drawn at random from the urn (without replacement) and are found to be white. What is the probability that all the four balls in the urn are white ?

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5. The chance of defective screws in three boxes $A, B, C are 1/5, 1/6, 1/7$, respectively. A box is selected at random and a screw draw in from it at random is found to be defective. Then find the probability that it came from box A.

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6. Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduce the risk of heart attack by 30% and prescription of certain drug reduces its chance by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga?

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7. The probability that a particular day in the month of July is a rainy day is $\frac{3}{4}$. Two person whose credibility and $\frac{4}{5}$ and $\frac{2}{3}$, respectively, claim that 15th July was a rainy day. Find the probability that it was really a rainy day.

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Exercise 14.6

1. A fair coin is tossed n times. if the probability that head occurs 6 times is equal to the probability that head occurs 8 times, then find the value of n.

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2. A die is thrown 4 times. Find the probability of getting at most two 6.

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3. The probability that a student is not a swimmer is $\frac{1}{5}$. Then the probability that out of five students, four are swimmers is (A) ${}^{5}C_{4}\left(\frac{4}{5}\right)^{4}\frac{1}{5}$ (B) $\left(\frac{4}{5}\right)^{4}\frac{1}{5}$ (C) ${}^{5}C_{1}\frac{1}{5}\left(\frac{4}{5}\right)^{4}$ (D) None of these

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4. about to only mathematics

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5. Numbers are selected at random, one at a time, from the two digit numbers 00,01,02...,99 with replacement. An event E occurs if the only product of the two digits of a selected number is 18. If four numbers are selected, find the probability that the event E occurs at least 3 times.

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MATRIX MATCH TYPE

1. Find the derivative of $y = \cos 3x^4$.

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2. Find the derivative of $s = \sec(3t + 2)$.

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LINKED COMPREHENSION TYPE

1. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses required.

The probability that $X = 3$ equals

A. $25/216$

B. $25/36$

C. $5/36$

D. $125/216$

Answer: A

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2. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses rerquired.

The probability that $X = \geq 3$ equals

A. $125/216$

B. $25/36$

C. $5/36$

D. $25/216$

Answer: B

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3. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses rerquired.

The conditional probability that $X \geq 6$ given $X > 3$ equals

A. $125/216$

B. $25/36$

C. $5/36$

D. $25/216$

Answer: D

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4. Let U_1 , and U_2, be two urns such that U_1, contains 3 white and 2 red balls, and U_2, contains only1 white ball. A fair coin is tossed. If head appears then 1 ball is drawn at random from U_1, and put into U_2, . However, if tail appears then 2 balls are drawn at random from U_1, and put into U_2. . Now 1 ball is drawn at random from U_2, . The probability of the drawn ball from U_2, being white is

A. $\frac{13}{30}$

B. $\frac{23}{30}$

C. $\frac{19}{30}$

D. $\frac{11}{30}$

Answer: B

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5. Let U1 and U2 be two urns such that U1 contains 3 white and 2 red balls, and U2 contains only 1 white ball. A fair coin is tossed. If head appears then 1 ball is drawn at random from U1 and put into U2. However, if tail appears then 2 balls are drawn at random from U1 and put into U2. Now 1 ball is drawn at random from U2.Given that the drawn ball from U2 is white, the probability that head appeared on the coin

A. $\frac{17}{23}$

B. $\frac{11}{23}$

C. $\frac{15}{23}$

D. $\frac{12}{23}$

Answer: D

Watch Video Solution

6. A box B_1 contains 1 white ball, 3 red balls, and 2 black balls. An- other box B_2 contains 2 white balls, 3 red balls. A third box B_3 contains 3 white balls, 4 red balls, and 5 black balls.

If 1 ball is drawn from each of the boxes B_1, B_2 and B_3, the probability that all 3 drawn balls are of the same color is

A. $82/648$

B. $90/648$

C. $558/648$

D. $566/648$

Answer: A

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7. A box B_1 contains 1 white ball, 3 red balls, and 2 black balls. An- other box B_2 contains 2 white balls, 3 red balls and 4 black balls. A third box B_3 contains 3 white balls, 4 red balls, and 5 black balls.

If 2 balls are drawn (without replecement) from a randomly selected box and one of the balls is white and the other ball is red the probability that these 2 balls are drawn from box B_2 is

A. $116/182$

B. $126/181$

C. $65/181$

D. $55/181$

Answer: D

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8. Let n_1 and n_2 be the number of red and black balls, respectively, in box I. Let n_3 and n_4 be the numbers of red and black balls, respectively, in the box II.

A ball is drawn at random from box I and transferred to box II. If the probability of drawing a red ball from box I, after this transfer, is 1/3, then the correct options (s) with the possible values of n_1 and n_2 is (are)

A. $n_1 = 3, n_2 = 3, n_3 = 5, n_4 = 15$

B. $n_1 = 3, n_2 = 6, n_3 = 10, n_4 = 50$

C. $n_1 = 8, n_2 = 6, n_3 = 5, n_4 = 20$

D. $n_1 = 6, n_2 = 12, n_3 = 5, n_4 = 20$

Answer: A::B

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9. Let n_1 and n_2 be the number of red and black balls, respectively, in box I. Let n_3 and n_4 be the numbers of red and black balls, respectively, in the box II.

A ball is drawn at random from box I and transferred to box II. If the probability of drawing a red ball from box I, after this transfer, is 1/3, then the correct options (s) with the possible values of n_1 and n_2 is (are)

A. $n_1 = 4$ and $n_2 = 6$

B. $n_1 = 2$ and $n_2 = 3$

C. $n_1 = 10$ and $n_2 = 20$

D. $n_1 = 3$ and $n_2 = 6$

Answer: C::D

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10. Football teams T_1 and T_2 have to play two games are independent. The probabilities of T_1 winning, drawing and lossing a game against T_2 are $\frac{1}{2}, \frac{1}{6}$ and $\frac{1}{3}$, respectively. Each team gets 3 points for a win, 1 point for a draw and 0 point for a loss in a game. Let X and Y denote the total points scored by teams T_1 and T_2 respectively, after two games.

$P(X > Y)$ is

A. $\frac{1}{4}$

B. $\frac{5}{12}$

C. $\frac{1}{2}$

D. $\frac{7}{12}$

Answer: B

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11. Football teams T_1 and T_2 have to play two games against each other. It is assumed that the outcomes of the two games are independent. The probabilities of T_1 winning,drawing and losing a game against T_2 are $\frac{1}{2}, \frac{1}{6}$ and $\frac{1}{3}$, respectively. Each teams gets 3 points for a win, 1 point of a drawn and 0 point for a loss in a games.

$P(X = Y)$ is

A. $\frac{11}{36}$

B. $\frac{1}{3}$

C. $\frac{13}{36}$

D. $\frac{1}{2}$

Answer: C

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NUMARICAL VALUE TYPE

1. Of the three independent event E_1, E_2 and E_3, the probability that only E_1 occurs is α, only E_2 occurs is β and only E_3 occurs is γ. If the probavvility p that none of events E_1, E_2 or E_3 occurs satisfy the equations $(\alpha - 2\beta)p = \alpha\beta$ and $(\beta - 3\gamma)p = 2\beta\gamma$. All the given probabilities are assumed to lie in the interval (0, 1). Then, $\frac{\text{probability of occurrence of } E_1}{\text{probability of occurrence of } E_3}$ is equal to

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Single correct Answer

1. If four vertices a regular octagon are chosen at random, then the probability that the quadrilateral formed by them is a rectangle is

A. $\frac{1}{8}$

B. $\frac{2}{21}$

C. $\frac{1}{32}$

D. $\frac{2}{35}$

Answer: D

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2. Six fair dice are thrown independently. The probability that three are exactly 2 same pairs (A pair is an ordered combination like 1, 1, 2, 2, 3, 4) is

A. 5/72

B. 26/72

C. 125/144

D. 25/36

Answer: D

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3. if letters of the word MATHEMATICS are arranged then the probability that C come before E,E before H ,H before I and I before S

A. $\frac{1}{75}$

B. $\frac{1}{24}$

C. $\frac{1}{120}$

D. $\frac{1}{720}$

Answer: C

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4. Two squares are chosen at random on a chessboard, the probability that they have a side in common is:

A. $\frac{3}{32}$

B. $\frac{1}{32}$

C. $\frac{1}{18}$

D. none of these

Answer: A

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5. In a game of chance a player throws a pair of dice and scores points equal to the difference between the numbers on the two dice. Winner is the person who scores exactly 5 points more than his opponent. If two players are playing this game only one time, then the probability that neither of them wins to

A. $\frac{1}{54}$

B. $\frac{1}{108}$

C. $\frac{53}{54}$

D. $\frac{107}{108}$

Answer: C

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6. If a and b are randomly chosen from the set $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, then the probability that the expression $ax^4 + bx^3 + (a+1)x^2 + bx + 1$ has positive values for all real values of x is

A. $\frac{34}{81}$

B. $\frac{31}{81}$

C. $\frac{32}{81}$

D. $\frac{10}{27}$

Answer: C

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7. A word of at least 5 letters is made at random from 3 vowels and 3 constants, all the letters being different. The probability that no consonant falls between any two vowels in the word is

A. $\frac{9}{20}$

B. $\frac{9}{10}$

C. $\frac{7}{10}$

D. $\frac{11}{20}$

Answer: D

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8. Matrices of order 3×3 are formed by using the elements of the set $A = \{-3, -2, -1, 0, 1, 2, 3\}$, then probability that matrix is either symmetric or skew symmetric is

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9. A box contains 10 tickets numbered from 1 to 10 . Two tickets are drawn one by one without replacement. The probability that the "difference between the first drawn ticket number and the second is not less than `4" is

A. $\frac{7}{30}$

B. $\frac{14}{30}$

C. $\frac{11}{30}$

D. $\frac{10}{30}$

Answer: A

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10. Three vertices are chosen randomly from the seven vertices of a regular 7-sided polygon. The probability that they form the vertices of an isosceles triangle is

A. $\frac{1}{7}$

B. $\frac{1}{3}$

C. $\frac{3}{7}$

D. $\frac{3}{5}$

Answer: D

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11. Given four pair of gloves, they are distributed to four persons. Each person is given a right-handed and left-handed glove, then the probability that no person gets a pair is

A. $3/8$

B. $5/8$

C. $1/4$

D. $3/4$

Answer: A

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12. The probability that $\sin^{-1}(\sin x) + \cos^{-1}(\cos y)$ is an integer $x, y \in \{1, 2, 3, 4\}$ is

A. $\frac{1}{16}$

B. $\frac{3}{16}$

C. $\frac{15}{16}$

D. $\frac{14}{16}$

Answer: B

Watch Video Solution

13. Of all the mappings that can be defined from the set $A:\{1, 2, 3, 4\} \rightarrow B:\{5, 6, 7, 8, 9\}$, a mapping is randomly selected. The chance that the selected mapping is strictly monotonic is

A. $\frac{1}{125}$

B. $\frac{2}{125}$

C. $\frac{3}{25}$

D. $\frac{6}{25}$

Answer: B

Watch Video Solution

14. 5 different balls are placed in 5 different boxes randomly. Find the probability that exactly two boxes remain empty. Given each box can hold any number of balls.

A. $\frac{24}{125}$

B. $\frac{12}{25}$

C. $\frac{96}{125}$

D. None of these

Answer: B

Watch Video Solution

15. 10 different books and 2 different pens are given to 3 boys so that each gets equal number of things. The probability that the same boy does not receive both the pens is

A. $5/11$

B. $7/11$

C. $9/11$

D. $6/11$

Answer: C

Watch Video Solution

16. Let a function $f: X \to Y$ is defined where $X = \{0, 1, 2, 3, \ldots, 9\}$, $Y = \{0, 1, 2, \ldots, 100\}$ and $f(5) = 5$, then the probability that the function of type $f: x \to B$ where $B \subseteq Y$ is of bijective in nature is

A. $\dfrac{10!}{\sum_{r=1}^{101} r^9 \cdot {}^{100}C_{r-1}}$

B. $\dfrac{{}^{101}C_9 \cdot 9!}{\sum_{r=1}^{101} r^{10} \cdot {}^{100}C_r}$

C. $\dfrac{{}^{100}C_9 \cdot 9!}{\sum_{r=1}^{101} r^{10} \cdot {}^{101}C_r}$

D. $\dfrac{{}^{100}C_9 \cdot 9!}{\sum_{r=1}^{101} r^9 \cdot {}^{101}C_{r-1}}$

Answer: D

Watch Video Solution

17. Two distinct numbers a and b are chosen randomly from the set $\left\{2, 2^2, 2^3, \dots .2^{25}\right\}$. Then the probability that $\log_a b$ is an integer is

A. $\frac{131}{300}$

B. $\frac{31}{300}$

C. $\frac{21}{200}$

D. $\frac{62}{300}$

Answer: B

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18. Given that $x \in [0, 1]$ and $y \in [0, 1]$. Let A be the event of selecting a point (x, y) satisfying $y^2 \geq x$ and B be the event selecting a point (x, y)

satisfying $x^2 \geq y$, then

A. $P(A \cap B) = \frac{1}{3}$

B. $A \subset B$

C. $2P(A) = 3P(B)$

D. $P(B) < P(A)$

Answer: A

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19. A and B are 2 events such that $P(A) = \frac{3}{4}$ and $P(B) = \frac{5}{8}$. If a and b are the possible minimum and maximum values of $P(A \cap B)$, then the value of $a + b$ is

Watch Video Solution

20. If A and B are two events such that $P(A \cap B) = 0.3$ and $P(A' \cap B') = 0.6$, then the value of $P(A \cap B'$ or $A' \cap B)$ is equal to

A. 0.9

B. 0.7

C. 0.3

D. 0.1

Answer: D

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21. The probability that a dealer will sell at least $20TV$ sets during a day is 0.45 and the probability that he will sell less than $24TV$ sets is 0.74. The probability that he will sell 20, 21, 22 or 23 TV sets during the day is

A. 0.19

B. 0.29

C. 0.333

D. 0.81

Answer: A

Watch Video Solution

22. Consider the Cartesian plane R^2 and let X denote the subset of points for which both coordinates are integer. A coin of diameter $1/2$ is tossed randomly onto the plane. The probability p that the coin covers a point of X

A. 0.2

B. 0.8

C. 1.2

D. None of these

Answer: A

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Watch Video Solution

23. A die is thrown 31 times. The probability of getting $2, 4$ or 5 at most 15 times is

A. $\frac{1}{3}$

B. $\frac{1}{4}$

C. $\frac{1}{5}$

D. $\frac{1}{2}$

Answer: D

Watch Video Solution

24. The records of a hospital show that 10% of the cases of a certain disease are fatal. If 6 patients are suffering from the disease, then the probability that only three will die is

A. 1458×10^{-5}

B. 1458×10^{-6}

C. 41×10^{-6}

D. 8748×10^{-5}

Answer: A

Watch Video Solution

25. The probabilities of A, B and C solving a problem independently are respectively $\frac{1}{4}, \frac{1}{5}, \frac{1}{6}$. If 21 such problems are given to A, B and C then the probability that at least 11 problems can be solved by them is

A. ${}^{21}C_{11}\left(\frac{1}{2}\right)^{11}$

B. $\frac{1}{2}$

C. $\left(\frac{1}{2}\right)^{11}$

D. none of these

Answer: B

Watch Video Solution

26. A fair coin is tossed until one of the two sides occurs twice in a row. The probability that the number of tosses required is even is

A. $1/3$

B. $2/3$

C. $1/4$

D. $3/4$

Answer: B

Watch Video Solution

27. A man throws a die until he gets a number greater than 3. The probability that he gets 5 in the last throw

A. $1/3$

B. $1/4$

C. $1/6$

D. $1/36$

Answer: A

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28. Suppose A and B are two events with $P(A) = 0.5$ and P(AuuB)=0.8LetP(B)=p` if A and B are mutually exclusive and P(B)=q if A and B are independent events, then value of q/p is ____.

A. $p = q$

B. $p = 2q$

C. $2p = q$

D. $p + q = 1$

Answer: C

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29. A biased coin with probability $p(0 < p < 1)$ of falling tails is tossed until a tail appears for the first time. If the probability that tail comes in odd number of trials is $\frac{2}{3}$, then p equals

A. $\frac{1}{4}$

B. $\frac{1}{3}$

C. $\frac{3}{4}$

D. $\frac{1}{2}$

Answer: D

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30. Assume that the birth of a boy or girl to a couple to be equally likely, mutually exclusive, exhaustive and independent of the other children in the family. For a couple having 6 children, the probability that their "three oldest are boys" is

A. $\frac{20}{64}$

B. $\frac{1}{64}$

C. $\frac{8}{64}$

D. none of these

Answer: C

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31. Two persons A and B get together once a weak to play a game. They always play 4 games . From past experience Mr. A wins 2 of the 4 games just as often as he wins 3 of the 4 games. If Mr. A does not always wins or always loose, then the probability that Mr. A wins any one game is (Given the probability of A's wining a game is a non-zero constant less than one).

A. 0.5

B. 0.6

C. 0.8

D. 0.9

Answer: B

Watch Video Solution

32. Suppose A and B shoot independently until each hits his target. They have probabilities 3/5 and 5/7 of hitting the targets at each shot. Find the probability than B will require more shots than A.

A. $5/21$

B. $6/31$

C. $7/41$

D. none of these

Answer: B

Watch Video Solution

33. A fair die is tossed repeatedly. A wins if if is 1 or 2 on two consecutive tosses and B wins if it is 3,4,5 or 6 on two consecutive tosses. The probability that A wins if the die is tossed indefinitely is a.$1/3$ b. $5/21$ c. $1/4$ d. $2/5$

A. $\frac{1}{3}$

B. $\frac{1}{4}$

C. $\frac{5}{21}$

D. $\frac{2}{5}$

Answer: C

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34. For two events A and B, if $P(A)P\left(\frac{A}{B}\right) = \frac{1}{4}$ and $P\left(\frac{B}{A}\right) = \frac{1}{2}$, then which of the following is not true ?

A. A and B are independent

B. $P\left(\frac{A'}{B}\right) = \frac{3}{4}$

C. $P\left(\frac{B'}{A'}\right) = \frac{1}{2}$

D. none of these

Answer: D

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35. A and B are events of an experiment such that $0 < P(A), P(B) < 1$. If $P(B') > P(A')$, then

A. $P(A \cap B') < P(A' \cap B)$

B. $P(A \cap B') = P(A' \cap B)$

C. $P(B/A) < P(A/B)$

D. $P(B/A) > P(A/B)$

Answer: C

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36. If A and B are two events such that $P(A) = 0.3$, $P(B) = 0.25$, $P(A \cap B) = 0.2$, then $P\left(\left(\frac{A^C}{B^C}\right)^C\right)$ is equal to

A. $\frac{2}{15}$

B. $\frac{11}{15}$

C. $\frac{13}{15}$

D. $\frac{14}{15}$

Answer: A

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37. A number is selected at random from the first twenty-five natural numbers. If it is a composite number, then it is divided by 5. But if it is not a composite number, it is divided by 2. The probability that there will be no remainder in the division is

A. $\frac{11}{30}$

B. 0.4

C. 0.2

D. none of these

Answer: C

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38. If two events A and B such that $P(A') = 0.3$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$, then $P(B/A \cup B')$ is

A. $3/8$

B. $2/3$

C. $5/6$

D. $1/4$

Answer: A

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39. In a hurdle race, a runner has probability p of jumping over a specific hurdle. Given that in 5 trials, the runner succeeded 3 times, the conditional probabilit that the runner had succeeded in the first trial is

A. $3/5$

B. $2/5$

C. $1/5$

D. None of these

Answer: A

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40. A box contains 4 white and 3 black balls. Another box contains 3 white and 4 black balls. A die is thrown. If it exhibits a number greater than 3`, the ball is drawn from the first box. Otherwise, a ball is drawn from the second box. A ball drawn is found to be black. The probability that it has been drawn from the second box is

A. $3/7$

B. $4/7$

C. $6/17$

D. $8/17$

Answer: B

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41. The probabilities of solving a problem correctly by A and B are $\frac{1}{8}$ and $\frac{1}{12}$ respectively. Given that they obtain the same answer after solving a problem and the probability of a common mistake by them is $\frac{1}{1001}$, then probability that their solution is correct is (Assuming that if they commit different mistake, then their answers will differ)

A. $\frac{77}{96}$

B. $\frac{14}{15}$

C. $\frac{2}{5}$

D. $\frac{13}{14}$

Answer: D

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42. The probability of event A is $3/4$. The probability of event B, given that event A occurs is $1/4$. The probability of event A, given that event B occurs is $2/3$. The probability that neither event occurs is

A. $\frac{1}{6}$

B. $\frac{27}{112}$

C. $\frac{5}{32}$

D. $\frac{1}{8}$

Answer: C

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43. An urn contains three white, six red and four black balls. Two balls are selected at random. What is the probability that one ball is red and other is white, given that they are of different colour ?

A. $\frac{2}{3}$

B. $\frac{1}{3}$

C. $\frac{1}{2}$

D. none of these

Answer: B

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44. Let A, B, C be 3 events such that $P(A/B) = \frac{1}{5}, P(B) = \frac{1}{2}, P(A/C) = \frac{2}{7}$ and $P(C) = \frac{1}{2}$, then $P(B/A)$ is

A. $\frac{4}{11}$

B. $\frac{5}{11}$

C. $\frac{6}{11}$

D. $\frac{7}{17}$

Answer: D

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45. A coin is tossed. If head appears a fair die is thrown three times otherwise a biased die with probability of obtaining an even number twice as that of an odd number is thrown three times. If (n_1, n_2, n_3) is an outcome, $(1 \le n_1 \le 6)$ and is found to satisfy the equation $i^{n_1} + i^{n_2} + i^{n_3} = 1,$, then the probability that a fair die was thrown is (where $i = \sqrt{-1}$)

A. $\frac{1}{12}$

B. $\frac{1}{3}$

C. $\frac{27}{59}$

D. none of these

Answer: C

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46. For any events A and B. Given $P(A \cup B) = 0.6$, $P(A) = P(B)$, $P(B/A) = 0.8$. Then the value of $P\left[\left(A \cap \bar{B}\right) \cup \left(\bar{A} \cap B\right)\right]$ is

A. $1/3$

B. $1/2$

C. $1/4$

D. $1/5$

Answer: D

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Multiple Correct Answer

1. The probablities of events , $A \cap B, A, B$ and $A \cup B$ are respectively in $A.P.$ with second term equal to the common difference. Therefore A and B are

A. mutually exclusive

B. independent

C. such that one of them must occur

D. such that one is twice as likely as the order

Answer: A::D

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2. 5 players of equal strength play one each with each other. $P(A)$ = probability that at least one player wins all matches he (they) play. $P(B)$ = probability that at least one player losses all his (their) matches.

A. $P(A) = \frac{5}{16}$

B. $P(B) = \frac{7}{16}$

C. $P(A \cap B) = \frac{5}{32}$

D. $P(A \cup B) = \frac{15}{32}$

Answer: A::B::D

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3. If A and B are exhaustive events in a sample space such that probabilites of the events $A \cap B, A, B$ and $A \cup B$ are in $A.P.$ If $P(A) = K$, where $0 < K \leq 1$, then

A. $P(B) = \frac{K+1}{2}$

B. $P(A \cap B) = \frac{3K - 1}{2}$

C. $P(A \cup B) = 1$

D. $P(A' \cup B') = \frac{3(1 - K)}{2}$

Answer: A::B::C::D

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4. A boy has a collection of blue and green marbles. The number of blue marbles belong to the set $\{2, 3, 4, \ldots\ldots, 13\}$. If two marbles are chosen simultaneously and at random from his collection, then the probability that they have different coloursis $\frac{1}{2}$. Possible number of the blue marbles is

A. 3

B. 6

C. 10

D. 12

Answer: A::B::C

View Text Solution

5. Let X denote the number of times heads occur in n tosses of a fair coin.

If $P(X = 4), \; P(X = 5) \; and \; P(X = 6)$ are in AP; the value of n is

A. $7, 14$

B. $7, 12$

C. $7, 10$

D. $7, 16$

Answer: A

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6. If $A_1, A_2, \ldots, A_n$ are any n events, then

A. $\sum_{i=1}^{n} P(A_i) = 1$

B. $\sum P(A_i) \leq 1$ if A_1, A_(2),.......,A_(n)` are disjoint

C. $\sum P(A_i) \geq 1$ if A_1, A_(2),.......,A_(n)` are exhaustive events

D. None of these

Answer: B::C

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7. A family has three children. Event $'A'$ is that family has at most one boy, Event $'B'$ is that family has at least one boy and one girl, Event $'C'$ is that the family has at most one girl. Then

A. Events $'A'$ and $'B'$ are independent

B. Events $'A'$ and $'B'$ are notindependent

C. Events A, B, C are independent

D. Events A, B, C are not independent

Answer: A::D

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8. A certain coin is tossed with probability of showing head being $'p'$. Let $'q'$ denotes the probability that when the coin is tossed four times the number of heads obtained is even. Then

A. there is no value of p, if $q = \frac{1}{4}$

B. there is exactly one value of p, if $q = \frac{3}{4}$

C. there are exactly three value of p, if $q = \frac{3}{5}$

D. there are exactly no value of p, if $q = \frac{4}{5}$

Answer: A::C

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9. A bag contains four tickets marked with numbers $112, 121, 211,$ and 222. One ticket is drawn at random from the bag. Let $E_i(i = 1, 2, 3)$ denote the event that ith digit on the ticket is 2. Then

A. E_1 and E_2 are independent

B. E_2 and E_3 are independent

C. E_3 and E_1 are independent

D. $E_1, E_2. E_3$ are independent

Answer: A::B::C

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10. Mohan post a letter to Sohan. It is known that one letter out of 10 letters do not reach its destination. If it is certain that Sohan will reply if he receives the letter. If A denotes the event that the Sohan receives the letter and B denotes the event that Mohan gets a reply, then

A. $P(B) = \frac{81}{100}$

B. $P(A \cap B) = \frac{81}{100}$

C. $P\left(\frac{A}{\bar{B}}\right) = \frac{9}{19}$

D. $P(A \cup B) = \frac{9}{10}$

Answer: A::B::C::D

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11. If E_1 and E_2 are two events such that $P(E_1) = 1/4$, $P(E_2/E_1) = 1/2$ and $P(E_1/E_2) = 1/4$, then

A. then E_1 and E_2 are independent

B. E_1 and E_2 are exhaustive

C. E_2 is twice as likely to occur as E_1

D. Probabilites of the events $E_1 \cap E_2, E_1$ and E_2 are in $G.P.$

Answer: A::C::D

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12. $P(A) = 3/8, P(B) = 1/2, P(A \cup B) = 5/8,$ which of the following do/does hold good?

A. $P\left(A^C/B\right) = 2P\left(A/B^C\right)$

B. $P(B) = P(A/B)$

C. $15P\left(A^c/B^C\right) = 8P\left(B/A^C\right)$

D. $P\left(A/B^C\right) = (A \cap B)$

Answer: A::B::C::D

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13. Consider the word POSSIBILITY. In the arrangement of the letters of the above word let A and B denote the event that the $2S's$ are together and the $3I's$ are together respectively, then

A. $P(A) = P(B) = \frac{3}{11}$

B. $P(A \cap B) = \frac{2}{165}$

C. $P(A \cup B) = \frac{7}{31}$

D. $P(B/A) = \frac{1}{15}$

Answer: B::D

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Comprehension

1. A slip of paper is given to a person A who marks it either with a plus sign or a minus sign. The probability of his writing a plus sign is $1/3$. A passes the slip to B, who may either leave it alone or change the sign before passing it to C. Next C passes the slip to D after perhaps changing the sign. Finally D passes it to a refere after perhaps changing the sign. $B, C, Deachchan \geq thesignwithprobability$2//3

. *Theprobabilitytt̂herefereeobservesaplussignontheslip* if *itisknownt* $\hat{A}$`

wrote a plus sign is

A. $14/27$

B. $16/27$

C. $13/27$

D. $17/27$

Answer: C

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2. A slip of paper is given to a person A who marks it either with a plus sign or a minus sign. The probability of his writing a plus sign is $1/3$. A passes the slip to B, who may either leave it alone or change the sign before passing it to C. Next C passes the slip to D after perhaps changing the sign. Finally D passes it to a refere after perhaps changing the sign. $B, C, Deachchan \geq thesignwithprobability$2//3`.

If the refree observes a plus sign on the slip then the probability that A originally wrote a plus sign is

A. $13/41$

B. $19/27$

C. $17/25$

D. $21/37$

Answer: A

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Question Bank

1. If two events A and B are such that $P\left(A^{l}\right)=0.3,\ P(B)=0.4$ and $P\left(A\cap B^{l}\right)=0.5$, then $P\left(\dfrac{B}{A\cup B^{l}}\right)$ equals

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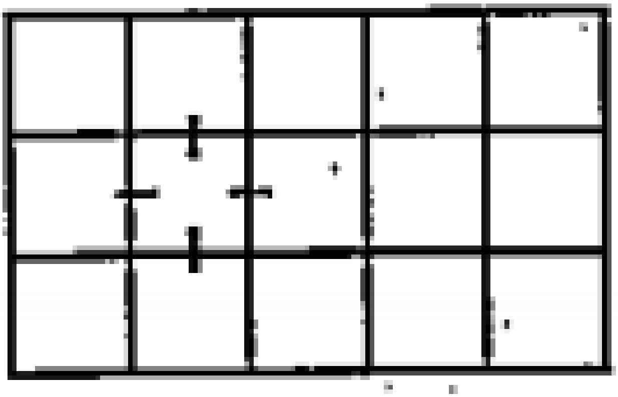
2. There are 4 horizontal and .6 vertical equispaced lines as shown. If a rectangle is randomly selected then probability that is a square is



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3. A number x is chosen at random from the first 100 natural numbers. Let A be the event of numbers which satisfies $\frac{(x-10)(x-50)}{x-30} \geq 0$,then P(A) is:

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4. A and B stand in a ring along with 10 other pèrsons. If the arrangement is at random, the probability that there are exactly 3 persons between A and B, is

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5. A 2×2 matrix is formed with entries from the set $0, 1$. The probebility that it is singular, is

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6. Two boys A and B find the jumble of n ropes lying on the floor. Each takes hold of one loose end randomly. If the probability that they are both holding the same rope is $\frac{1}{101}$ then the number of ropes is equal to

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7. On a normal standard dic one of the 21 dots from any one of the six faccs is removéd at random with each dot equally likely to be chosen. The die is then rolled. The probability that the top face has an odd number of dots is

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8. Miss C has either Tea or Coffee at moming break. If she has tea one morning, the probability she bas tea the next moming is 0.4. If she has coffee one morning, the probability she has coffee next moming is 0.3. Suppose she has coffee on a Monday morning. The probability that she has tea on the following Wednesday morning is

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9. A bowl hes 6 red marbles and 3 green marbles. The probebility that a blind folded person will draw u red marble on the second draw from the bowl without replacing the marble from the first draw, is

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10. Lot A consists of $3G$ and $2D$ articles. Lot B consists of $4G$ and $1D$ article. A new lot C is formed by taking 3 articles from A and 2 from B. The probability that an article chosen at random from C is defective, is

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11. Let A and B are cvents of an experiment of $P(A) = \frac{1}{4}, P(A \cup B) = \frac{1}{2}$ then value of $P\left(BlA^C\right)$ is $\frac{1}{k}$ then value of k is

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12. The probability that a positive two digit number selected at random has its tens digit at least three more than its unit digit is

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13. If the papers of 4 students randomly đistributed for checking among 7 teachers, then the probability that all the 4 papers are checked by exactly 2 teachers is nim where n, m are 'natural numbers and $HCF(n, m) = 1$. Then number of positive divisors of $(n + m)$ is

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14. A six faced fair dice is thrown until 2 comes, then the probability that 2 comes in even number of trials is (dice having six faces numbered $1, 2, 3, 4, 5$ and 6)

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15. If a variable takes the discrete values $p + 4, p - \frac{7}{2}, p - \frac{5}{2}, p - 3, p - 2, p + \frac{1}{2}, p - \frac{1}{2}, p + 5(p > 0)$, and the median $p - K$ then find k

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16. The variance of 20 observations is 5 . If eech observation is multiplied by 2 then the new variance of the resulting observations, is:

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17. The mean weight of 9 items is 15 . If one more item is added to the series, the mean becomes 16 . The value of 10^{th} item is

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18. Consider the frequency distribution of the given pumber If mean of the distribution is cqual to 3 , then the value of f is

Value	1	2	3	4
Frequency	5	4	0	f

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19. $x_1, x_2 .... x_{34}$ are numbers such that $x_i = x_i + 1 - 150 \forall i \in 1, 2, 3, ...9$ and $x_i + 1 - x_i + 2 = 0 \ \forall f \in 10, 11, 12, ...33$, then median of $x_j x_2, ...x_{34}$ is

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20. The mean of 5 observations is 4 and their variancé is $52.$ If three of them are $1, 2, 6$ then the sum of other two

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21. If $x_1, x_2, . . x_{18}$ are observations sach the $\sum_{j=1}^{18} \left(x_j - 8\right) = 9$ and $\sum_{j=1}^{18} \left(x_j - 8\right)^2 = 45$, then the standard deviation. of these observations is:

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22. Two cards are drawn without replacement from a wellshuffled deck of 52 cards. Let X be the number of face cards drawn, then the sum of mean and variance of X will be.

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23. Let $x_1, x_2 \dots x_n$ be n observations sach that $\sum x_i^2 = 200$ and $\sum x_i = 40$ then least integral value of n

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24. If in a frequency distribution, the mean and median are 25 and 26 , then its mode is approximately.

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