MATHS

BOOKS - ARIHANT MATHS

PROBABILITY

Examples

1. If three coins are tossed, represent the sample space and the event of getting atleast two heads, then find the number of elements in them.

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2. One ticket is drawn at random from a bag containing 24 tickets numbered 1 to 24. Represent the sample space and the event of drawing

a ticket containing number which is a prime. Also, find the number of elements in them.

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3. Two dice are thrown simultaneously. What is the probability obtaining a total score less than 11?

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4. Find the probability that a leap year, selected at random, will contain 53 Sundays.

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5. From a pack of 52 playing cards, three cards are drawn at random. Find the probability of drawing a king, a queen and a jack

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6. A bag contians 8 red and 5 white balls. Three balls are drawn at random. Find the probability that

(i) all the three balls are white.

(ii) all the three balls are red.

(iii) one ball is red and two balls are white.

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7. For a post,three persons A, B and C appearin the interview. The probability of A being selected is twice that of B and the probability of b being selected is thrice that of C. What of the individual probability of A, B and C being selected?

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

the probaility of the occurrence of A.

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9. A and B are two candidates seeking admission to IIT. The probability that A is selected is 0.5 and the probability that A and B are selected is at most 0.3. Is it possible that the probability of B getting selected is 0.9?

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10. 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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11. Let A, B and C be three events such that $P(A) = 0.3, P(B) = 0.4, P(C) = 0.8, P(A \cap B) = 0.08, P(A \cap C) = 0.2$. If $P(A \cup B \cup C) \geq 0.75$, then show that $P(B \cap C)$ satisfies $0.23 \leq P(B \cap C) \leq 0.48$.

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12. Two dice are thrown . Find the probability that the sum of number coming up on them is 9, if it is known that the number 5 always occurs on the first dice.

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13. In a class, 30% students fail in English, 20% students fail in Hindi and 10% students fail in both English and Hindi. A student is chosen at random, then what is the probability he fail in English, if he has failed in Hindi?

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

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15. Three groups A, B and C are contesting for positions on the Board of Directors of a company. The probability of their winning are 0.5, 0.3 and 0.2, respectively. If the froup A wins, then the probabilityof introducing a new product is 0.7 and the corresponding probabilies for groups B and C are 0.6 and 0.5, respectively. Find the probability that the new product will be introduced.

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16. 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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17. A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red and balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag B.

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18. A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually six.

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19. In a test, an examinee either guesses or copies or knows the answer to a multiple choice question with four choices. The probability that he makes a guess is 1/3 and the probability that he copies the answer is 1/6. The probability that his answer is correct given that he copied it is 1/8. Find the probability that he knew the answer to the question, given that he correctly answered it.

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20. A and B are two independent witnesses (i.e., there is no collision between them) in a case. The probability that A will speak the truth is x and the probability that B will speak the truth is y. A and B agree in a certain statement. Show that the probability that the statement is true is $\frac{xy}{1-x-y+2xy}$.

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21. If one out of 10 coming ships is wrecked. Find the probability that out of five coming ships at least 4 reach safely.

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22. 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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23. A man takes a step forward with probability 0.4 and backward with probability 0.6. The probability that at the end of eleven steps he is just one step away from the starting point, is

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24. The minimum number of tosses of a pair of dice so that the probability of getting the sum of the digits on the dice equal to 7 on atleast one toss is greater than 0.95, is, then $\frac{n+1}{6}$ is

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25. Write probability distribution, when three coins are tossed.

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26. A random variable X has poisson's distribution with mean 3. Then find the value of $P(X > 2.5)$.

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27. A and B throw with one die for a stake of ₹11 which is to be won by the player who first throw 6. If A has the first throw, then what are their respective expectations?

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28. A person throws two dice, one the common cube and the other a regular tetrahedron, the number on the lowest face being taken in the case of the tetrahedron, then find the probability that the sum of the numberd appearing on the dice is 6.

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29. Five ordinary dice are rolled at random and the sum of the numbers shown on them is 16.What is the probability that the numbers shown on each is any one from 2, 3, 4 or 5?

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30. Two persons A and B agree to meet at a place between 11 to 12 noon. The first one to arrive waits for 20 minutes and then leave. if the time of

their arrival be independent and at random, then the probability that A and B meet is:

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31. 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

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32. If three points P, Q, R are taken at random on the circumference of a circle, the chance that do not lie on the same semicircle is

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33. A wire of length I is cut into three pleces. What Is the probability that the three pieces form a triangle ?

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34. The probability that in a year of $22nd$ centurychosen at random, there will be 53 Sundays is

A. $\frac{3}{28}$

B. 3/175

C. $\frac{7}{28}$

D. $\frac{5}{28}$

Answer:

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35. In a convex hexagon two diagonals are drawn at random. The probability that the diagonals intersect at an interior point of the hexagon is

A. $\frac{5}{12}$

B. $\frac{7}{12}$

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

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

Answer:

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36. 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

A. $\frac{1}{57}$

B. $\frac{13}{19}$

C. $\frac{2}{19}$

D. $\frac{194}{285}$

Answer:

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37. If three numbers are selected from the set of the first 20 natural numbers, the probability that they are in GP, is

A. $\frac{1}{285}$

B. $\frac{4}{285}$

C. $\frac{11}{1140}$

D. $\frac{1}{71}$

Answer:

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38. Two numbers b and c are chosen at random with replacement from the numbers 1, 2, 3, 4, 5, 6, 7, 8 and 9. The probability that $x^2 + bx + c > 0 f \text{ or } all\xi nR,$ is

A. $\frac{17}{123}$

B. $\frac{32}{81}$

C. $\frac{82}{125}$

D. $\frac{45}{143}$

Answer:

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39. Three dice are thrown. The probability of getting a sum which is a perfect square, is

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

B. $\frac{9}{20}$

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

D. Non of these

Answer:

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40. A quadratic equation is chosen from the set of all quadratic equations which are unchanged by squaring the roots. The chance that the chosen equation has equal root, is

A. (a) $\frac{1}{2}$

B. (b) $\frac{1}{3}$

C. (c) $\frac{1}{4}$

D. (d)None of these

Answer:

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41. Three-digit numbers are formed using the digits $0, 1, 2, 3, 4, 5$ without repetition of digits. If a number is chosen at random, then the probability that the digits either increase or decrease, is

A. $\frac{1}{10}$

B. $\frac{2}{11}$

C. $\frac{3}{10}$

D. $\frac{4}{11}$

Answer:

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42. If X follows a binomial distribution with parameters $n = 8$ and $p = 1/2$, then $p(|X - 4| \leq 2)$ equals

A. $\frac{121}{128}$

B. $\frac{119}{128}$

C. $\frac{117}{128}$

D. $\frac{115}{128}$

Answer:

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43. 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? a.$91/165$ b. $90/163$ c. $82/161$ d. $95/167$

A. $\frac{89}{167}$

B. $\frac{91}{167}$

C. $\frac{93}{167}$

D. $\frac{95}{167}$

Answer:

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44. Let p_n denote the probability of getting n heads, when a fair coinis tossed m times. If p_4, p_5, p_6 are in AP then values of m can be

A. 5

B. 7

C. 10

D. 14

Answer:

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45. A random variable X follows binomial distribution with mean a and variance b. Then,

A. $a > b < 0$

B. $\frac{a}{b} < 1$

C. $\frac{a^2}{a-b}$ is an integer

D. $\frac{a^2}{a-b}$ is not an integer

Answer:

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46. If $A_1, A_2, \ldots, A_n$ are n independent events, such that $P(A_i) = \frac{1}{i+1}, i = 1, 2, \ldots, n$, then the probability that none of $A_1, A_2, \ldots, A_n$ occur, is

A. $\frac{n}{n+1}$

B. $\frac{1}{n+1}$

C. less then $\frac{1}{n}$

D. greater than $\frac{1}{n+2}$

Answer:

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47. If A and B are two events such that $P(A \cup B) \geq \frac{3}{4}$ and $\frac{1}{8} \leq P(A \cap B) \leq \frac{3}{8}$ then

A. $P(A) + P(B) \leq \frac{11}{8}$

B. $P(A) \cdot P(B) \leq \frac{3}{8}$

C. $P(A) + P(B) \geq \frac{7}{8}$

D. None of these

Answer:

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48. Evluate $\int (x^2 + x)\, dx$

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49. Each coefficient in the equation $ax^2 + bx + c = 0$ is determined by throwing an ordinary die.

Q. The probability that roots of quadratic are real and distinct, is

A. $\frac{5}{216}$

B. $\frac{19}{108}$

C. $\frac{173}{216}$

D. $\frac{17}{108}$

Answer:

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50. Each coefficient in the equation $ax^2 + bx + c = 0$ is determined by throwing an ordinary six faced die. Find the probability that the equation will have real roots.

A. $\frac{5}{216}$

B. $\frac{19}{108}$

C. $\frac{173}{216}$

D. $\frac{17}{108}$

Answer:

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51. Each coefficient in the equation $ax^2 + bx + c = 0$ is determined by throwing an ordinary die.

Q. The probability that roots of quadratic are imaginary, is

A. $\frac{103}{216}$

B. $\frac{133}{216}$

C. $\frac{157}{216}$

D. $\frac{173}{216}$

Answer:

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52. A box contains n coins, Let $P(E_i)$ be the probability that exactly i out of n coins are biased. If $P(E_i)$ is directly proportional to $i(i+1), 1 \leq i \leq n.$

Q. Proportionality constant k is equal to

A. $\frac{3}{n(n^2+1)}$

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

C. $\frac{3}{n(n+1)(n+2)}$

D. $\frac{1}{(n+1)(n+2)(n+3)}$

Answer:

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53. A box contains n coins, Let $P(E_i)$ be the probability that exactly i out of n coins are biased. If $P(E_i)$ is directly proportional to $i(i+1), 1 \leq i \leq n.$

.If P be the probabiloity that a coin selected at random is biased, then lim_(xto oo) P is

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

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

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

D. $\frac{7}{8}$

Answer:

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54. A box contains n coins, Let $P(E_i)$ be the probability that exactly i out of n coins are biased. If $P(E_i)$ is directly proportional to $i(i+1), 1 \leq i \leq n.$

.If P be the probabiloity that a coin selected at random is biased, then lim_(xto oo) P is

A. 3/4

B. 0.65

C. 0.70

D. 0.85

Answer:

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55. Let S be the set of the first 18 natural numbers, then the probability of choosing $\{x, y\} \in S$, such that $x^3 + y^3$ is divisible by 3, is

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

B. $\frac{1}{5}$

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

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

Answer:

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56. Let S be the set of the first 21 natural numbers, then the probability of Choosing $\{x, y, z\} \subseteq S$, such that x,y,z are in AP, is

A. $\frac{5}{133}$

B. $\frac{10}{133}$

C. $\frac{3}{133}$

D. $\frac{2}{133}$

Answer:

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57. Let S be the set of the first 21 natural numbers, then the probability of Choosing $\{x, y, z\} \subseteq S$, such that x,y,z are not consecutive is,

A. $\frac{17}{70}$

B. $\frac{34}{70}$

C. $\frac{51}{70}$

D. $\frac{34}{35}$

Answer:

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58. Find the differentiate of $\sin x + 2x$ with respect to x

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59. The digits 1, 2, 3, 4, 5, 6, 7, 8, and 9 are written in random order to form a nine digit number.Let p be the probability that this number is divisible by 36, find 9p.

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60. A man P speaks truth with probability p and another man A speaks truth with probability 2p.

Statement-1 If P and Q contradict each other with probability $\frac{1}{2}$, then there are two values of p.

Statement-2 a quadratic equation with real coefficients has two real roots.

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer:

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61. A fair die is thrown twice. Let (a, b) denote the outcome in which the first throw shows 'a' and the second throw shows 'b' . Let A and B be the following events :

A={(a,b): a is even}, B={(a,b): b is even}

Statement-1: If C={(a,b): a+b is odd}, then $P(A \cap B \cap C) = \frac{1}{8}$

Statement-2: If D={(a,b): a+b is even}, then $P(A \cap B \cap D / A \cup B) = \frac{1}{3}$

a. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

b. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

c. Statement-1 is true, Statement-2 is false

d. Statement-1 is false, Statement-2 is true

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer:

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62. 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.

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63. A has 3 shares in a lottery containing 3 prizes and 9 blanks, B has 2 shares in a lottery containing 2 prizes and 6 blanks. Compare their chances of success

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64. 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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65. Five persons entered the lift cabin on the groud floor of an 8 floors house. Suppose that each of them, independent and with equal probability can leave the cabin at any of floor beginning with the first. Find put the probability of all five persons leaving at different floors.

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66. Let X be a set containing n elements. Two subsets A and B of X are chosen at random, the probability that $A \cup B = X$ is

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67. Two persons each make a single throw with a pair of dice. The probability that the throws are unequal is given by:

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68. If X and Y are independent binomial vatiates $B\left(5, \frac{1}{2}\right)$ and $B\left(7, \frac{1}{2}\right)$ and the value of $P(X+Y=3)$ is

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69. The probability that the graph of $y = 16x^2 + 8(a+5)x - 7a - 5 = 0,$ is strictly above the x-axis, If $a \in [-20, 0]$

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70. 3 distinct integers are selected at random form 1, 2, 3, ..., 20. find out the probability that the sum is divisible by 5

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71. 5 girls and 10 boys sit at random in a row having 15 shairs numbered as 1 to 15. Find the probability that end seats are occupied by the girls and between any two girls odd numbers of boys sit.

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72. A four digit number (numbered from 0000 to 9999) is said to be lucky if sum of its first two digits is equal to the sum of its last two digits. If a four digit number is picked up at random then the probability that it is lucky number is :-

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73. Out of (2n+1) tickets consecutively numbered, three are drawn at random. Find the chance that the numbers on them are in AP.

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

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75. if $6n$ tickets numbered 0,1,2,..... 6n-1 are placed in a bag and three are drawn out , show that the chance that the sum of the numbers on then is equal to 6n is $\frac{3n}{(6n-1)(6n-2)}$

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Example

1. The mean and variance of a binomial variable X are 2 and 1, respectivily. Find the probability that X takes values greater than 1 .

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2. Evluate $\int \left(3x^2+2x\right)\,dx$

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3. If A and B are two independent events, such that $P(A) = \frac{1}{3}$ and $P(B) = \frac{1}{4}$.

	Column I		Column II
(A)	If $P\left(\frac{A}{B}\right) = \lambda_1$, then $12\lambda_1$ is	(p)	a prime number
(B)	If $P\left(\frac{A}{A \cup B}\right) = \lambda_2$, then $9\lambda_2$ is	(q)	a composite number
(C)	If $P[(A \cap \bar{B}) \cup (\bar{A} \cap B)] = \lambda_3$, then $12\lambda_3$ is	(r)	a natural number
(D)	If $P(\bar{A} \cup B) = \lambda_4$, then $12\lambda_4$ is	(s)	a perfect number

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4. (i)If four squares are chosen at random on a chess board, find the probability that they lie on diagonal line.

(ii) If two squares are chosen at random on a chess board, what is the Probability that they have exactly on corner in common?

(iii) If nine squares are chosen at random on a chess board, what is the probability that they form a square of size 3x3?

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Exercise For Session 1

1. Probabilities of A, B and C of solving a problem are : $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively.What is the probability that the problem will be solved?

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

B. $\frac{1}{2}$

C. $\frac{2}{3}$

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

Answer: (a)

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2. A dice is thrown three times and the sum of the thrown numbers in 15. Find the probability for which number 4 appears in first throw.

A. $\frac{1}{5}$

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

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

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

Answer: (a)

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3. Three faces of a fair die are yellow, two faces red and one blue. The die is tossed three times. Find the probabiliry that the colours yellow, red and blue appear In the 1 st and 2nd and the 3rd tosses respectively

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

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

C. $\frac{1}{24}$

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

Answer: (d)

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4. A speaks truth in 75% and B in 80% of the cases. In what percentage of cases are they likely to contradict each other in narrating the same incident?

A. $30\ \%$

B. $35\ \%$

C. $45\ \%$

D. $25\ \%$

Answer: (b)

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5. 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 all the 4 times is a.$16/81$ b. $1/81$ c. $80/81$ d. $65/81$

A. $\frac{16}{81}$

B. $\frac{1}{81}$

C. $\frac{80}{81}$

D. $\frac{65}{81}$

Answer: (a)

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

A. $\frac{11}{40}$

B. $\frac{7}{20}$

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

D. $\frac{7}{40}$

Answer: (c)

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7. Seven white balls and three black balls are randomly placed in a row. The probability that no two black balls are placed adjacently equals a.$1/2$ b. $7/15$ c. $2/15$ d. 1/3

A. $\frac{1}{2}$

B. $\frac{7}{20}$

C. $\frac{2}{15}$

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

Answer: (b)

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8. 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.$1/15$ b. $14/15$ c. $1/5$ d. $4/5$

A. $\frac{1}{15}$

B. $\frac{14}{15}$

C. $\frac{1}{15}$

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

Answer: (d)

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9. If $\frac{1+3p}{3}, \frac{1-p}{4}$ and $\frac{1-2p}{2}$ are the probabilities of three mutually exclusive events, then find the set of all values of p.

A. $[0, 1]$

B. $\left[0, \frac{1}{2}\right]$

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

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

Answer: (d)

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10. Three identical dice are rolled . Find the probability that the same number will appear on each of them .

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

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

C. $\frac{1}{14}$

D. $\frac{3}{28}$

Answer: (d)

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11. If the letters of the word ASSASSIN are written down in a row, the probability that no two S's occur together, is

A. $\frac{1}{35}$

B. $\frac{1}{21}$

C. $\frac{1}{14}$

D. $\frac{1}{28}$

Answer: (c)

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12. A box contains 2 balck, 4 white, and 3 balls. One ball is drawn at random from the box and kept aside to first. This process is repeated till all the balls are drawn from the box. The probability that the balls drwn are in the sequences of 2 black, 4 white and 3 red is

A. $\frac{1}{126}$

B. $\frac{1}{630}$

C. $\frac{1}{1260}$

D. $\frac{1}{2520}$

Answer: (c)

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13. 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. $4/25$ b. $4/35$ c. $4/33$ d. $4/1155$

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14. There are 2 vans each having numbered seats, 3 in the front and 4 at the back. There are 3 girls and 9 boys to be seated in the vans. The probablity of 3 girls sitting together in a back row on adjacent seats, is

A. $\frac{1}{13}$

B. $\frac{1}{39}$

C. $\frac{1}{65}$

D. $\frac{1}{91}$

Answer: (d)

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15. A and B stand in a ring with 10 other persons . If the arrangement of the twelve persons is at random , find the chance that there are exactly three persons between A and B.

A. $\frac{1}{11}$

B. $\frac{2}{11}$

C. $\frac{3}{11}$

D. $\frac{4}{11}$

Answer: (b)

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16. The first twelve letters of the alphabet are written down at random . What is the probability that there are four letters between the A and the B?

A. $\frac{7}{33}$

B. $\frac{7}{66}$

C. $\frac{7}{99}$

D. $\frac{5}{33}$

Answer: (b)

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17. If 6 boys and 6 grils sit in a row at random, then the probability that all the girls sit together is

A. $\frac{3}{304}$

B. `(1)/(132)

C. $\frac{2}{205}$

D. $\frac{4}{407}$

Answer: (a)

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

A. $\frac{13}{32}$

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

C. $\frac{1}{32}$

D. $\frac{3}{16}$

Answer: (a)

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19. The probability of getting number less than or equal to 6, when a die is thrown once, is

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

B. $\frac{1}{2}$

C. $\frac{5}{6}$

D. 1

Answer: (c)

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20. 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. $\frac{3}{10}$

B. $\frac{1}{20}$

C. $\frac{1}{120}$

D. $\frac{1}{7920}$

Answer: (c)

Watch Video Solution

Exercise For Session 2

1. If $P(A) = 0.8, P(B) = 0.5$, then $P(A \cap B)$ lies in the interval

A. $[0.2, 0.5]$

B. $[0.2, 0.3]$

C. $[0.3, 0.5]$

D. $[0.1, 0.5]$

Answer: (c)

Watch Video Solution

2. If $P(A) = \frac{1}{4}, P(B) = \frac{1}{13}$ and $P(A \cap B) = \frac{1}{52}$, then the value of $P(\overline{A} \cap \overline{B})$, is

A. $\frac{3}{13}$

B. $\frac{5}{13}$

C. $\frac{7}{13}$

D. $\frac{9}{13}$

A. $\frac{3}{13}$

B. $\frac{5}{13}$

C. $\frac{7}{13}$

D. $\frac{9}{13}$

Answer: (d)

Watch Video Solution

3. If A and B are two independent events such that $P(\overline{A} \cap B) = 2/15$ and $P(A \cap \overline{B}) = 1/6$, then P(B), is

A. $\frac{1}{5}$

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

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

D. $\frac{5}{6}$

Answer: (b)

Watch Video Solution

4. If A and B are two events such that $P(A \cup B) = \frac{5}{6}, P(A) = \frac{1}{3}$ and $P(B) = \frac{3}{4}$, then A and B are

A. mutually exclusive

B. dependent

C. independent

D. None of these

Answer: (c)

Watch Video Solution

5. A,B and C are three mutually exclusive and exhaustive events associated with a random experiment . Find P(A) given that $P(B) = \frac{3}{2}P(A)$ and $P(C) = \frac{1}{2}P(B)$.

A. $\frac{2}{13}$

B. $\frac{4}{13}$

C. $\frac{6}{13}$

D. $\frac{8}{13}$

Answer: (b)

Watch Video Solution

6. If A and B are two events, then $P(A) + P(B) = 2P(A \cap B)$ if and only if

A. $P(A) + P(B) = 1$

B. $P(A) = P(B)$

C. $P(A) + P(B) > 1$

D. None of these

Answer: (b)

Watch Video Solution

7. If A and B are two events such that $P(A \cap B) = \frac{1}{4}, P(A) = P(B) = q$ and $P(\overline{A} \cap \overline{B}) = \frac{1}{5}$ then q is equal to

A. $\frac{17}{40}$

B. $\frac{19}{40}$

C. $\frac{21}{40}$

D. $\frac{23}{40}$

Answer: (c)

Watch Video Solution

8. If A and B are two events such that $P(A \cup B) = \frac{3}{4}, P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{2}{3}$ then $P(\overline{A} \cap B)$ is equal to

A. $\frac{11}{12}$

B. $\frac{3}{8}$

C. $\frac{5}{8}$

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

Answer: (a)

Watch Video Solution

9. If P(B) $= \frac{3}{4}$ $P\left(A \cap B \cap \bar{c}\right) = \frac{1}{3}$ and $P\left(\bar{A} \cap B \cap \bar{C}\right) = \frac{1}{3}$, then $P(B \cap C)$ is equal to

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

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

C. $\frac{1}{15}$

D. $\frac{1}{15}$

Answer: (a)

Watch Video Solution

10. If A and B are two events such that $P(A) > 0$ and $P(B) \neq 1$, then $P\left(\frac{\overline{A}}{\overline{B}}\right)$ is equal to

A. $1 - P\left(\frac{A}{B}\right)$

B. $1 - P\left(\frac{A}{\overline{B}}\right)$

C. $P\left(\frac{\overline{A}}{B}\right)$

D. P(B ') 1−P(A∪B)

Answer: (b)

Watch Video Solution

11. If $P(A) = \frac{3}{8}, P(B) = \frac{5}{8}$ and $P(A \cup B) = \frac{3}{4}$, then P(A | B).P(A' |B) is equal to

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

B. $\frac{1}{9}$

C. $\frac{6}{25}$

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

Answer: (c)

Watch Video Solution

12. If two events A and B are such that $P(\overline{A}) = 0.3, P(B) = 0.4$ and $P(A \cap \overline{B}) = 0.5,$ then $P\left(\frac{B}{A \cup \overline{B}}\right)$ is equal to

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

B. $\frac{1}{5}$

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

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

Answer: (a)

Watch Video Solution

13. Two dice are thrown. Find the probability that the numbers appeared has the sum 8, if it is known that the second die always exhibits 4.

A. $\frac{5}{6}$

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

C. $\frac{2}{3}$

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

Answer: (b)

Watch Video Solution

14. A is targeting to B, B and C are targeting to A. Probability of hitting the target by A, B and C are $\frac{2}{3}, \frac{1}{2}$ and $\frac{1}{3}$, respectively, If A is hit, then find the probability that B hits the target and C does not.

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

B. $\frac{1}{2}$

C. $\frac{2}{3}$

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

Answer: (b)

Watch Video Solution

15. If A and B are events such that $P\left(\frac{A}{B}\right) = P\left(\frac{B}{A}\right)$, then

A. A=B

B. P(A)=P(B)

C. A and B are independent

D. All of these

Answer: (b)

Watch Video Solution

Exercise For Session 3

1. A bag A contains 3 white and 2 black balls and another bag B contains 2 white and 4 black balls. A bag and a ball out of it are picked at random. What is the probability that the ball is white?

A. $\frac{2}{7}$

B. $\frac{7}{9}$

C. $\frac{4}{15}$

D. $\frac{7}{15}$

Answer: (d)

Watch Video Solution

2. There are two bags, on e of which contain s 3 black and 4 white, balls, while the other contains 4 black and 3 whit 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.

A. $\frac{7}{15}$

B. $\frac{8}{15}$

C. $\frac{10}{21}$

D. $\frac{11}{21}$

Answer: (d)

Watch Video Solution

3. There are two groups of subjects, one of which consists of 5 science subjects and 3 Engineering subjects and the other consists of 3 science and 5 Engineering subjects. An unbiased die is cast. If number 3 or 5 turns up, a subject from 1 is selected otherwise a subject is selected from group 2. The probability that an Engineering subject is selected ultimately, is

A. $\frac{7}{13}$

B. $\frac{9}{17}$

C. $\frac{13}{24}$

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

Answer: (c)

Watch Video Solution

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

A. $\frac{6}{11}$

B. $\frac{17}{50}$

C. $\frac{16}{55}$

D. $\frac{32}{55}$

Answer: (d)

Watch Video Solution

5. A box contains N coins, m of wiich 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 ?

A. $\frac{5m}{m+8n}$

B. $\frac{3m}{m+8N}$

C. $\frac{7m}{m+8N}$

D. $\frac{9m}{m+8N}$

Answer: (d)

Watch Video Solution

6. Factorise : $8x^3 + y^3 + 27z^3 - 18xyz$

Watch Video Solution

7. A purse contain n coins of unknown values .a coin is drawn from it at random and is found to be a rupee .Then the chance that it is the only rupee coin in the purse is

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

B. $\frac{2}{n+1}$

C. $\frac{2}{(n(n+1))}$

D. $\frac{2}{(n+1)}$

Answer: c

Watch Video Solution

8. 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.

A. $\frac{2}{17}$

B. $\frac{3}{17}$

C. $\frac{4}{17}$

D. $\frac{5}{17}$

Answer: c

Watch Video Solution

9. A person is known to speak the truth 4 times out of 5. He throws a die and reports that it is an SIX. The probability that it is actually an six, is

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

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

C. $\frac{4}{9}$

D. $\frac{5}{9}$

Answer: c

Watch Video Solution

10. 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 .

A. 10

B. 11

C. 13

D. 12

Answer: a

Watch Video Solution

Exercise For Session 4

1. The probability of getting exactly two heads when tossing a coin three times is

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

B. $\frac{1}{8}$

C. $\frac{3}{8}$

D. $\frac{5}{8}$

Answer: (c)

Watch Video Solution

2. A coin is tossed 4 times. The probability that at least one head comes up is :

A. $\frac{1}{16}$

B. $\frac{1}{8}$

C. $\frac{7}{8}$

D. $\frac{15}{16}$

Answer: (d)

Watch Video Solution

3. The following is the probability distribution of a random vaiable X.

The value of k is

X	1	2	3	4	5
$P(X)$	0.1	0.2	k	0.3	$2k$

A. $\frac{4}{15}$

B. $\frac{1}{15}$

C. $\frac{1}{5}$

D. $\frac{2}{15}$

Answer: (d)

Watch Video Solution

4. A random variable X has the distribution.

Then , variance of the distribution, is

X	2	3	4
$P(X = x)$	0.3	0.4	0.3

A. 0.6

B. 0.7

C. 1.55

D. 0.77

Answer: (a)

Watch Video Solution

5. A box contains 100 bulbs out of which 10 are defective. A sample of 5 bulbs is drawn. The probability that none is defective , is

A. 10^{-5}

B. 2^{-5}

C. $(0.9)^5$

D. 0.9

Answer: (c)

Watch Video Solution

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

A. $\frac{2}{7}$

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

C. $\frac{3}{7}$

D. None of these

Answer: (a)

Watch Video Solution

7. If X follows the binomial distribution with parameters n=6 and p and 9p(X=4)=P(X=2), then p is

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

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

C. $\frac{1}{2}$

D. $\frac{2}{3}$

Answer: (a)

Watch Video Solution

8. If the probability of defective bolts is 0.1, find the mean and standard deviation for the distribution of defective bolts in a total of 500 bolts.

A. $30, 3$

B. $40, 5$

C. $30, 4$

D. $50, 6.71$

Answer: (d)

Watch Video Solution

9. The mean and variance of a binomial distribution are $\frac{5}{4}$ and $\frac{15}{16}$ respectively, then value of p, is

A. $\frac{1}{2}$

B. $\frac{15}{16}$

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

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

Answer: (c)

Watch Video Solution

10. The mean and variance of a binomial distribution are 6 and 4 respectively, then n is

A. 9

B. 12

C. 18

D. 10

Answer: (c)

Watch Video Solution

11. A die is thrown 100 times, getting an even number is considered a success. The variance of the number of successes is

A. 10

B. 20

C. 25

D. 50

Answer: (c)

Watch Video Solution

12. 10% of tools produced by a certain manufacturing process turn out to be defective. Assuming binomial distribution, the probability of 2 defective in sample of 10 tools chosen at random, is

A. 0.368

B. 0.194

C. 0.271

D. Non of these

Answer: (b)

Watch Video Solution

13. If X follows a binomial distribution with parameters $n = 100$ and $p = \frac{1}{3}$, then $P(X = r)$ is maximum when

a. 16

b. 32

c. 33

d. none of these

A. 16

B. 32

C. 33

D. None of these

Answer: (c)

Watch Video Solution

14. The expected value of the number of points, obtained in a single throw of die, is

A. $\frac{3}{2}$

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

C. $\frac{7}{2}$

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

Answer: (c)

Watch Video Solution

15. Two points are taken at random on the given straight line segment of length a. The probability for the distance between them to exceed a given

length b, where $0 < b < a$, is

A. $\frac{b}{a}$

B. $\frac{b^2}{a^2}$

C. $\left(\frac{a-b}{a}\right)^2$

D. $\left(\frac{a-2b}{a-b}\right)^2$

Answer: (a)

Watch Video Solution

Exercise Single Option Correct Type Questions

1. There are 2 vans each having numbered seats, 3 in the front and 4 at the back. There are 3 girls and 9 boys to be seated in the vans. The probablity of 3 girls sitting together in a back row on adjacent seats, is

A. $\frac{1}{13}$

B. $\frac{1}{39}$

C. $\frac{1}{65}$

D. $\frac{1}{91}$

Answer: (d)

Watch Video Solution

2. Evluate $\int (a+x)\,dx$

Watch Video Solution

3. The probability that a leap year selected ar random contains either 53 sundays or 53 mondays, is

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

B. $\frac{2}{7}$

C. $\frac{3}{7}$

D. $\frac{4}{7}$

Answer: (c)

Watch Video Solution

4. A positive integer N is selected so as to be $100 < N < 200$. Then, the probability that it is divisible by 4 or 7, is

A. $\frac{7}{33}$

B. $\frac{17}{33}$

C. $\frac{32}{99}$

D. $\frac{34}{99}$

Answer: (d)

Watch Video Solution

5. Two numbers are selected at random from 1,2,3,....100 and are multiplied, then the probability correct to two places of decimals that the

product thus obtained is divisible by 3, is

a. $\frac{67}{150}$

b. $\frac{83}{150}$

c. $\frac{67}{75}$

d. $\frac{8}{75}$

A. $\frac{67}{150}$

B. $\frac{83}{150}$

C. $\frac{67}{75}$

D. $\frac{8}{75}$

Answer: (b)

Watch Video Solution

6. Three different numbers are selected at random from the set $A = (1, 2, 3, \ldots., 10)$. The probability that the product of two of the numbers is equal to the third is

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

B. $\frac{1}{40}$

C. $\frac{1}{8}$

D. $\frac{39}{40}$

Answer: (b)

Watch Video Solution

7. The numbers 1,2,3,.., n are arranged in a random order. The probability that the digits $1, 2, 3, \ldots, k(n > k)$ appears as neighbours in that order is

A. $\frac{1}{n!}$

B. $\frac{K!}{n!}$

C. $\frac{(n-k)!}{n!}$

D. $\frac{(n-k+1)!}{n!}$

Answer: (d)

Watch Video Solution

8. The numbers 1,2,3,.., n are arranged in a random order. The probability that the digits $1, 2, 3, \ldots, k (n > k)$ appears as neighbours in that order is

a. $\frac{(n-k)!}{n!}$

b. $\frac{(n-k+1)!}{.n!}$

c. $\frac{n-k}{,^n C_k}$

c. $\frac{k!}{n!}$

A. $\frac{(n-k)!}{n!}$

B. $\frac{(n-k+1)!}{.^n C_k}$

C. $\frac{n-k}{,^n C_k}$

D. $\frac{k!}{n!}$

Answer: (b)

Watch Video Solution

9. Four identical dice are rolled once. The probability that at least three different numbers appear on them, is

A. $\frac{13}{42}$

B. $\frac{17}{42}$

C. $\frac{23}{42}$

D. $\frac{25}{42}$

Answer: (d)

Watch Video Solution

10. Three of the six vertices of a regular hexagon are chosen the random. What is the probability that the triangle with these vertices is equilateral.

A. $\frac{1}{2}$

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

C. $\frac{1}{10}$

D. $\frac{1}{20}$

Answer: (c)

Watch Video Solution

11. If two of the 64 squares are chosen at random on a chess board, the probability that they have a side in common is

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

B. $\frac{1}{9}$

C. $\frac{1}{18}$

D. $\frac{5}{18}$

Answer: (c)

Watch Video Solution

12. A letter is known to have come from CHENNAI, JAIPUR, NAINITAL, DUBAI and MUMBAI. On the post mark only two consecutive letters AI are legible. Then, the probability that it is come from MUMBAI, is

a. $\frac{42}{319}$

b. $\frac{84}{403}$

c. $\frac{39}{331}$

d. $\frac{42}{331}$

A. $\frac{42}{319}$

B. $\frac{84}{403}$

C. $\frac{39}{331}$

D. $\frac{42}{331}$

Answer: (b)

Watch Video Solution

13. Let a die is loaded in such a way that prime number faces are twice as likely to occur as a non prime number faces. The probability that an odd number will be show up when die is tossed is-

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

B. $\frac{2}{3}$

C. $\frac{4}{9}$

D. $\frac{5}{9}$

Answer: (d)

Watch Video Solution

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

A. $\frac{2}{3}$

B. $\frac{2}{19}$

C. $\frac{1}{50}$

D. None of these

Answer: (b)

Watch Video Solution

15. All the spades are taken out from a pack of cards. From these cards; cards are drawn one by one without replacement till the ace of spades comes. The probability that the ace comes in the 4th draw is

A. $\frac{1}{13}$

B. $\frac{12}{13}$

C. $\frac{4}{13}$

D. None of these

Answer: (a)

Watch Video Solution

16. A number is selected at random from the first 25 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. Find the probability that there will be no remainder in the division.

A. $\frac{11}{30}$

B. 0.4

C. 0.2

D. None of these

Answer: (c)

Watch Video Solution

17. A bag contains 50 tickets numbered 1, 2, 3, .., 50 of which 5 are drawn at random and arranged in ascending order of magnitude

$x_1 < x_2 < x_3 < x_4 < x_5$ Find the probability that $x_3 = 30$.

a. $\frac{.^{20}C_2 \times .^{29}C_2}{.^{50}C_5}$

b. $\frac{.^{20}C_2}{.^{50}C_5}$

c. $\frac{.^{29}C_2}{.^{50}C_5}$

d. None of these

A. $\frac{.^{20}C_2 \times .^{29}C_2}{.^{50}C_5}$

B. $\frac{.^{20}C_2}{.^{50}C_5}$

C. $\frac{.^{29}C_2}{.^{50}C_5}$

D. None of these

Answer: (a)

Watch Video Solution

18. 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 getting atleast 7 points is

A. 0.8750

B. 0.0875

C. 0.0625

D. 0.0250

Answer: (b)

Watch Video Solution

19. Three six faced dice are tossed together, then the probability that exactly two of the three numbers are equal is :

a. $\frac{165}{216}$

b. $\frac{177}{216}$

c. $\frac{51}{216}$

d. $\frac{90}{216}$

A. $\frac{165}{216}$

B. $\frac{177}{216}$

C. $\frac{51}{216}$

D. $\frac{90}{216}$

Answer: (d)

Watch Video Solution

20. Three six-faced dice are thrown together. The probability that the sum of the numbers appearing on the dice is $k(3 \leq k \leq 8)$, is

a. $\frac{(k-1)(k-2)}{432}$

b. $\frac{k(k-1)}{432}$

c. $\frac{k^2}{432}$

d. None of these

A. $\frac{(k-1)(k-2)}{432}$

B. $\frac{k(k-1)}{432}$

C. $\frac{k^2}{432}$

D. None of these

Answer: (a)

Watch Video Solution

21. A book contains 1000 pages. A page is chosen at random. Find the probability that the sum of the digits of the marked number on the page is equal to 9.

A. $\frac{23}{500}$

B. $\frac{11}{200}$

C. $\frac{7}{100}$

D. None of these

Answer: (b)

Watch Video Solution

22. A bag contains 4 tickets numbered 00, 01, 10 and 11. Four tickets are chosen at random with replacement, the probability that the sum of numbers on the tickets is 23 is

A. $\frac{3}{32}$

B. $\frac{1}{64}$

C. $\frac{5}{256}$

D. $\frac{7}{256}$

Answer: (a)

Watch Video Solution

23. 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 :

A. $\frac{1}{(15)^7}$

B. $\frac{8}{(15)^7}$

C. $\frac{3}{(5)^7}$

D. None of these

Answer: (c)

Watch Video Solution

24. A box contains tickets numbered 1 to 20.3 tickets are drawn from the box with replacement. The probability that the largest number on the tickets is 7, is

A. $\frac{7}{20}$

B. $1-\left(\frac{7}{20}\right)^3$

C. $\frac{2}{19}$

D. None of these

Answer: (d)

Watch Video Solution

25. An unbiased die with faces marked 1,2,3,45 and 6 is rolled four times . Out of four values obtained , the probability that the minimum face value is not less than 2 and the maximum face value is not greater than 5 is :

A. $\frac{16}{81}$

B. $\frac{1}{81}$

C. $\frac{80}{81}$

D. $\frac{65}{81}$

Answer: (a)

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26. A bag contains four tickets marked with numbers 112, 121, 211,222. One ticket is drawn at random from the bag. Let E_i (i = 1,2,3) denote the event that i^th digit on the ticket is 2. Then which of the following is incorrect ?

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 and E_3 are independent

Answer: (d)

Watch Video Solution

27. Two non negative integers are chosen at random. The probability that the sum of the square is divisible by 10, is

A. $\frac{17}{100}$

B. $\frac{9}{50}$

C. $\frac{7}{50}$

D. $\frac{9}{16}$

Answer: (b)

Watch Video Solution

28. Two positive real numbers x and y satisfying $x \leq 1$ and $y \leq 1$ are chosen at random. The probability that $x + y \leq 1$, given that $x^2 + y^2 \leq \frac{1}{4}$, is

A. $\frac{\pi}{16}$

B. $\frac{4\pi}{16}$

C. $\frac{\pi}{8}$

D. None of these

Answer: (a)

Watch Video Solution

29. If the lengths of the sides of a triangle are decided by the three thrown of a single fair die,then the probability that the triangle is of maximum area given that it is an isosceles triangle, is

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

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

C. $\frac{1}{21}$

D. None of these

Answer: (b)

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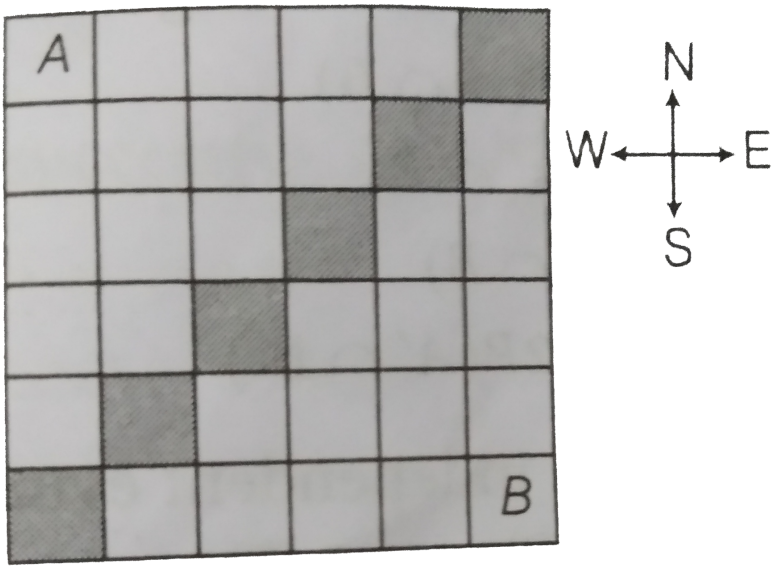
Probability Exercise 1 Single Option Single Correct Type Question

1. A and B are persons standing in corner square as shown in the figure. They start to move on same time with equal speed, of A can move in East

or South diretion and B can move in North or West diretion. If in each step they reach in next square and their choice of direction are equlity. If it is given that A and B meet in shaded region, then the probability that they have met in the top most shaded square, is



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

B. $\frac{.^5C_2}{.^{10}C_3}$

C. $\frac{1}{.^{10}C_5}$

D. $\frac{1}{2^5 \times 6}$

Answer: (c)

Watch Video Solution

Exercise More Than One Correct Option Type Questions

1. For two given event 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 $P(A) + P(B) + P(A \cup B)$

Answer: (a,b,c)

Watch Video Solution

2. If E and F are independent events such that $0 < P(E) < 1$ and $0 < P(F) < 1$, then

A. E and F are mutually exclusive

B. E and $\overline{F}$ (complement of the event F) are independent

C. $\overline{E}$ and $\overline{F}$ are independent

D. $P\left(\frac{E}{F}\right)+P\left(\frac{\overline{E}}{F}\right)=1$

Answer: (b,c,d)

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3. For any two events A and B in a sample space, choose the correct option (s)

A. (a)$P\left(\frac{A}{B}\right) \geq \frac{P(A)+P(B)-1}{P(B)}, P(B) \neq 0$ is always true

B. (b)$P(A \cap B)=P(A)-P\left(\overline{A} \cap \overline{B}\right)$, does not hold

C. (c)$P(A \cup B)=1-P\left(\overline{A}\right)P\left(\overline{B}\right)$, If A and B are independent

D. (d)$P(A \cup B)=1-P\left(\overline{A}\right)P\left(\overline{B}\right)$, if A and B are disjoint

Answer: (a,c)

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4. $EandF$ are two independent events. The probability that both $EandF$ happen is 1/12 and the probability that neither $EandF$ happens is 1/2. Then, $P(E) = 1/3, P(F) = 1/4$ $P(E) = 1/4, P(F) = 1/3$ $P(E) = 1/6, P(F) = 1/2$ $P(E) = 1/2, P(F) = 1/6$

A. $P(E) = \frac{1}{3}, P(F) = \frac{1}{4}$

B. $P(E) = \frac{1}{6}, P(F) = \frac{1}{2}$

C. $P(E) = \frac{1}{2}, P(F) = \frac{1}{6}$

D. $P(E) = \frac{1}{4}, P(F) = \frac{1}{3}$

Answer: (a,d)

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5. If E and F are the complementary events of events E and F, respectively, and if P(F) $\in$ [0,1]

A. $P\left(\frac{\overline{E}}{F}\right)+P\left(\frac{\overline{E}}{F}\right)=1$

B. $P\left(\frac{E}{F}\right)+P\left(\frac{E}{\overline{F}}\right)=1$

C. $P\left(\frac{\overline{E}}{F}\right)+P\left(\frac{E}{\overline{F}}\right)=1$

D. $P\left(\frac{E}{\overline{F}}\right)+P\left(\frac{\overline{E}}{\overline{F}}\right)=1$

Answer: (a,b)

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6. If $0<P(A)<1, 0<P(B)<1$ and $P(A\cup B)=P(A)+P(B)-P(A)P(B)$, then

A. $P(B-A)=P\left(\frac{B}{A}\right)$

B. $P(A'\cup B')=P(A')+P(B')$

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

D. $P\left(\frac{A}{B}\right)=P(A)$

Answer: (c,d)

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7. If A and B are two events, the probability that exactly one of them occurs is given by

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

B. $P(A \cap B') + P(A' \cap B)$

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

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

Answer: (a,b,c,d)

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8. If A and B are two independent events such that $P(A) = \frac{1}{2}$ and $P(B) = \frac{1}{5}$ then which of the following is correct ?

A. a) $P(A \cup B) = \frac{3}{5}$

B. b) $P\left(\frac{A}{B}\right)=\frac{1}{2}$

C. c) $P\left(\frac{A}{A\cup B}\right)=\frac{5}{6}$

D. d) $P\left(\frac{A\cap B}{A'\cup B'}\right)=0$

Answer: (a,b,c,d)

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9. 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. $p=1, q=0$

B. $p=\frac{2}{3}, q=\frac{1}{2}$

C. $p=\frac{3}{5}, q=\frac{2}{3}$

D. infinitely values of p and q

Answer: (a,b,c)

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10. Let X be a set containing n elements. If two subsets A and B of X are picked at random, the probability that A and B have the same number of elements is

A. $\frac{.^2 nC_n}{2^n}$

B. $\frac{1}{.^2 nC_n}$

C. $\frac{1 \cdot 3 \cdot 5 \ldots (2n-1)}{2^n \cdot n!}$

D. $\frac{3^n}{4^n}$

Answer: (a,c)

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11. Five boys and four girls sit in a row randomly. The probability that no two girls sit together

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12. Evluate $\int \left(\sec^2 + x\right) dx$

Watch Video Solution

13. $(n \geq 5)$ persons are sitting in a row. Three of these are selected at random. The probability that no two of the selected persons sit together is

A. $\frac{.^{n-3}P_2}{.^{n}P_2}$

B. $\frac{.^{n-3}C_2}{.^{n}C_2}$

C. $\frac{(n-3)(n-4)}{n(n-1)}$

D. $\frac{.^{n-3}C_2}{.^{n}P_2}$

Answer: (a,b,c,d)

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14. Given that $x \in [0, 1]$ and $y \in [0, 1]$. Let A be the event of selecting a point (x, y) satisfying $y^2 \leq x$ and B be the event selecting a point (x, y) satisfying $x^2 \leq y$, then

A. $P(A \cap B) = \frac{1}{3}$

B. A and B are exhuastive

C. A and B are mutually

D. A and B are independent

Answer: (b,c,d)

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15. If the probability of choosing an integer 'k' out of 2n integers 1, 2, 3, ..., 2n is inversely proportional to $k^4(1 \leq k \leq 2n)$. If α is the probability that chosen number is odd and β is the probability that chosen number is even, then (A) $\alpha > \frac{1}{2}$ (B) $\alpha > \frac{2}{3}$ (C) $\beta < \frac{1}{2}$ (D) $\beta < \frac{2}{3}$

A. $\alpha > \frac{1}{2}$

B. $\alpha > \frac{2}{3}$

C. $\beta \leq \frac{1}{2}$

D. $\left(\beta < \frac{2}{3}\right)$

Answer: (a,c)

Watch Video Solution

Exercise Passage Based Questions

1. If p and q 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.

A. 0.38

B. 0.03

C. 0.62

D. 0.89

Answer: (c)

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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.

The probability that roots of $x^2 + px + q = 0$ are imaginary, is

A. 0.58

B. 0.55

C. 0.38

D. 0.03

Answer: (d)

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3. 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.

A. 0.62

B. 0.38

C. 0.59

D. 0.89

Answer: (b)

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4. A chess game between Kamsky and Anand is won by whoever first wins 2 out of 3 games. Kamsky's chance of winning, drawing or lossing a particular game are p, q, r. The games are independent and $p+q+r=1$. Prove that the probability that Kamsky wins the match is $\frac{p^2(P+3r)}{(p+r)^3}$.

A. na^2b^{n-1}

B. $na^2b^{n-2}(b+(n-1)c)$

C. na^2bc^{n-1}

D. $nab^{n-1}(b+nc)$

Answer: (b)

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5. A chess game between two grandmasters X and Y is won by whoever first wins a total of two games. X's chances of winning or loosing any perticular game are a, b and c, respectively. The games are independent

and a+b+c=1.

The probability that Y wins the match after the 4th game, is

A. (a)$abc(2a+3b)$

B. (b)$bc^2(a+3b)$

C. (c)$2ac^2(b+c)$

D. (d)$3bc^2(2a+b)$

Answer: (d)

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6. A chess game between two grandmasters X and Y is won by whoever first wins a total of two games. X's chances of winning or loosing any perticular game are a, b and c, respectively. The games are independent and a+b+c=1.

The probability that Y wins the match after the 4th game, is

A. $\frac{a^{a+2c}}{(a+c)^3}$

B. $\frac{a^3}{(a+c)^3}$

C. $\frac{a^2(a+3c)}{(a+c)^3}$

D. $\frac{c^3}{(a+c)^3}$

Answer: (c)

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7. There are n students in a class. Ler $P(E_\lambda)$ be the probability that exactly λ out of n pass the examination. If $P(E_\lambda)$ is directly proportional to $\lambda^2(0 \leq \lambda \leq n)$.

If P(A) be the probability that a student selected at random has passed the examination, then P(A), is

A. $\frac{1}{\sum n}$

B. $\frac{1}{\sum n^2}$

C. $\frac{1}{\sum n^3}$

D. $\frac{1}{\sum n^4}$

Answer: (b)

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8. There are n students in a class. Ler $P(E_\lambda)$ be the probability that exactly λ out of n pass the examination. If $P(E_\lambda)$ is directly proportional to $\lambda^2(0 \leq \lambda \leq n)$.

Proportional constant k is equal to

A. 0.25

B. 0.5

C. 0.75

D. 0.35

Answer: (c)

Watch Video Solution

9. There are n students in a class. Ler $P(E_\lambda)$ be the probability that exactly λ out of n pass the examination. If $P(E_\lambda)$ is directly proportional to $\lambda^2(0 \leq \lambda \leq n)$.

Proportional constant k is equal to

A. $\frac{1}{\sum n}$

B. $\frac{1}{\sum n^2}$

C. $\frac{1}{\sum n^3}$

D. $\frac{1}{\sum n^4}$

Answer: (c)

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10. 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. (a)14

B. (b)18

C. (c)22

D. (d)26

Answer: (d)

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11. A cube having all of its sides painted is cut to be 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.

If P_3 is the probability that the cube selected has none of its sides painted, then the value of $27P_3$ is:

A. 3

B. 8

C. 12

D. 17

Answer: (c)

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12. A cube having all of its sides painted is cut to be 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.

If P_3 is the probability that the cube selected has none of its sides painted, then the value of $27P_3$ is:

A. (a) 1

B. (b) 2

C. (c) 3

D. (d) 5

Answer: (a)

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13. 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. The chance she will be successful is: a. 0.28 b. 0.38 c. 0.48 d. 0.58

A. 0.28

B. 0.38

C. 0.48

D. 0.58

Answer: (c)

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14. 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 will achieve success, the chance she studied for 4 hours is?

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

B. $\frac{5}{12}$

C. $\frac{7}{12}$

D. $\frac{11}{12}$

Answer: (c)

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15. 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 achieve success, the chance she studied for 4 hours is?

A. $\frac{15}{26}$

B. $\frac{17}{26}$

C. $\frac{19}{26}$

D. $\frac{21}{26}$

Answer: (d)

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16. Suppose E_1, E_2 and E_3 be three mutually exclusive events such that $P(E_i) = p_i$ for $i = 1, 2, 3$.

If p_1, p_2 and p_3 are the roots of $27x^3 - 27x^2 + ax - 1 = 0$ the value of a is

A. 3

B. 6

C. 9

D. 12

Answer: (c)

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17. Suppose E_1, E_2 and E_3 be three mutually exclusive events such that $P(E_i) = p_i$ for $i = 1, 2, 3.$

P(none of E_1, E_2, E_3) equals

A. 0

B. 1-$(p_1 + p_2 + p_3)$

C. $(1 - p_1)(1 - p_2)(1 - P_3)$

D. None of these

Answer: (b)

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18. Suppose E_1, E_2 and E_3 be three mutually exclusive events such that

$P(E_i) = p_i$ for $i = 1, 2, 3.$

$P\left(E_1 \cap \overline{E_2}\right) + P\left(E_2 \cap \overline{E_3}\right) + P\left(E_3 \cap \overline{E_1}\right)$ equals

A. (a)$p_1(1 - p_2) + p_2(1 - P_3) + p_3(1 - p_1)$

B. (b)$p_1p_2 + p_2p_3 + p_3p_1$

C. (c)0

D. (d)None of these

Answer: (c)

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19. Let A = {1, 2, 3}, B = {2, 4} and R = {(1, 2), (2, 2), (2, 4), (3, 4)}. Is a relation from A to B ?

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20. Let $A = \{1, , 2, 3\}$ and $B = \{-2, -1, 0, 1, 2, 3\}$.

The probability of increasing functions from A to b, is

A. $\frac{5}{27}$

B. $\frac{7}{27}$

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

D. $\frac{11}{27}$

Answer: (b)

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21. Let $A = \{1, , 2, 3\}$ and $B = \{-2, -1, 0, 1, 2, 3\}$.

The probability of non decreasing functions from A to B, is

A. 1/27

B. $\frac{35}{144}$

C. $\frac{29}{72}$

D. $\frac{25}{72}$

Answer: (a)

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22. A random variable X takes the values $0, 1, 2, 3, \ldots,$ with prbability $P(X = x) = k(x + 1)\left(\frac{1}{5}\right)^x$, where k is a constant, then $P(X = 0)$ is.

A. $\frac{2}{25}$

B. $\frac{4}{25}$

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

D. $\frac{16}{25}$

Answer: (d)

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23. A random variable X takes values 0, 1, 2, 3,... with probability proportional to $(x+1)\left(\frac{1}{5}\right)^x$.

$P(X \geq 2)$ equals

A. $\frac{11}{25}$

B. $\frac{13}{25}$

C. $\frac{11}{125}$

D. $\frac{13}{125}$

Answer: (d)

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24. A random variable X takes values $0, 1, 2, \ldots\ldots$ with probability proportional to (x with proba bility proportional to $(x+1)\left(\frac{1}{5}\right)^x$, , then $5 \cdot \left[P(x \leq 1)^{\frac{1}{2}}\right]$ equals

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

B. 2

C. $\frac{1}{2}$

D. 4

Answer: (c)

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25. Factorise : $8x^3 + y^3 + 27z^3 - 18xyz$

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26. Evaluate $\int \frac{2}{2x+12} dx$

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Exercise Single Integer Answer Type Questions

1. 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 n.

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2. A determinant of the second order is made with the elements 0 and 1. If $\frac{m}{n}$ be the probability that the determinant made is non negative, where m and n are relative primes, then the value of n-m is

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3. Three students appear at an examination of mathematics. The probability of their success are $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$ respectively. Find the probability of success of at least two.

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4. A die is rolled thrice, find the probability of getting a larger number each time than the previous number.

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5. In a multiple choice question, there are five alternative answers of which one or more than one are correct. A candidate will get marks on the question, if he ticks all the correct answers. If he decides to tick answer all random, then the least number of choices should he be allowed, so that the probability of his getting marks on the question exceeds $\frac{1}{8}$ is

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6. There are n different objects 1, 2, 3, ..., n distributed at random in n places marked 1, 2, 3,..., n. If p be the probability that atleast three of the object occupy places corresponding to their number, then the value of 6p is

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7. A sum of money is rounded off to the nearest rupee, if $\left(\frac{m}{n}\right)^2$ be the probability that the round off error is atleast ten prizes, where m and n are positive relative primes, then value of (n-m) is

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8. A special die is so constructed that the probabilities of throwing 1, 2, 3, 4, 5 and 6 are $\frac{1-k}{6}, \frac{1+2k}{6}, \frac{1-k}{6}, \frac{1+k}{6}, \frac{1-2k}{6}$ and $\frac{1+k}{6}$,

respectively. If two such thrown and the probability of getting a sum equal to lies between $\frac{1}{9}$ and $\frac{2}{9}$, then the integral value of k is

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9. Seven digits from the numbers 1 to 9 are written in random order. If the probability that this seven digit number divisible by 9 is p, then the value of 18p is

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10. 8 players $P_1, P_2, P_3, , P_8$ play a knock out tournament. It is known that all the players are of equal strength. The tournament is held in three rounds where the players are paired at random in each round. If it is given that P_1 wins in the third round.if p be the be the probability that P_2 loses in second round ,yhen the value of 7p is

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Probability Exercise 5 Match Type Questions

1. A and B are two events, such that $P(A) = \frac{3}{5}$ and $P(B) = \frac{2}{3}$ if A and B are independent then find P(A intersection B)

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2. Write the proper subsets of $\{2, 4, 6\}$

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3. Write the proper subsets of $\{1, 2, 3\}$

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4. Find the mean marks of the following cummulative frequency table :

Marks	No. of students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
90 and above	8
100 and above	0

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Exercise Statement I And Ii Type Questions

1. Statement-1 If 10 coins are thrown simultaneously, then the probability of appearing exactly four heads is equal to probability of appearing exactly six heads.

Statement-2 $.^{n}C_{r} = .^{n}C_{s} \Rightarrow$ either r=s or r+s=n and P(H)=P(T) in a single trial.

(a)Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

(b)Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

(c)Statement-1 is true, Statement-2 is false

(d)Statement-1 is false, Statement-2 is true

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: a

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2. Statement-1 If A is any event and $P(B) = 1$, then A and B are independent

Statement-2 $P(A \cap B) = P(A) \cdot P(B)$, if A and B are independent

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: a

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3. Statement-1 If A and B be the event in a sample space, such that $P(A) = 0.3$ and $P(B) = 0.2$, then $P\left(A \cap \overline{B}\right)$ cannot be found.

Statement-2 $P\left(A \cap \overline{B}\right) = P(A) + P\left(\overline{B}\right) - P\left(A \cap \overline{B}\right)$

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: a

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4. $A\{1, 2, 3, 4\}$ and $B\{5, 6, 7, 8\}$ then find the AUB

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5. 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.

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: c

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6. From a well shuffled pack of 52 playing cards, a card is drawn at random. Two events A and B are defined as

A: Red card is drawn

B: Card drawn is either a diamond or heart.

Statement: $P(A+B)=P(AB)$

Statement-2: $A \subseteq B \text{ and } B \subseteq A$

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: a

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7. Statement-1: The probability that A and B can solve a problem is $\frac{1}{2}$ and $\frac{1}{3}$ respectively, then the probability that problem will be solved $\frac{5}{6}$.

Statement-2: Above mentioned events are independent events.

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: d

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8. Statement-1: Out of 21 tickets with number 1 to 21, 3 tickets are drawn at random, the chance that the numbers on them are in AP is $\frac{10}{133}$.

Statement-2: Out of (2n+1) tickets consecutively numbered three are

drawn at ranodm, the chance that the number on them are in AP is (4n-10)/$\left(4n^2-1\right)$.

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: c

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9. Statement-1: if A and B are two events, such that $0 < P(A), P(B) < 1$, then $P\left(\frac{A}{\overline{B}}\right) + P\left(\frac{\overline{A}}{\overline{B}}\right) = \frac{3}{2}$

Statement-2: If A and B are two events, such that $0 < P(A), P(B) < 1$, then

$P(A/B) = \frac{P(A \cap B)}{P(B)}$ and $P(\overline{B}) = P(A \cap \overline{B}) + P(\overline{A} \cap \overline{B})$

a. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

b. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

c. Statement-1 is true, Statement-2 is false

d. Statement-1 is false, Statement-2 is true

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: d

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10. In a T-20 tournament, there are five teams. Each teams plays one match against every other team.

Each team has 50% chance of winning any game it plays. No match ends in a tie.

Statement-1: The Probability that there is an undefeated team in the tournament is $\frac{5}{16}$.

Statment-2: The probability that there is a winless team is the tournament is $\frac{3}{16}$.

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: c

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11. Statement-1: If p is chosen at random in the closed interval [0,5], then the probability that the equation

$x^2 + px + \frac{1}{4}(+ 2) = 0$ has real is $\frac{3}{5}$.

Statement-2: If discriminant ≥ 0, then roots of the quadratic equation are always real.

A. Statement-1 is true, Statement-2 is true: Statement-2 is a correct explanation for Statement-1

B. Statement-1 is true, Statement-2 is true: Statement-2 is not a correct explanation for Statement-1

C. Statement-1 is true, Statement-2 is false

D. Statement-1 is false, Statement-2 is true

Answer: d

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12. A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5red balls. One ball is drawn at random from one of the bags and it is found to be red. Then, find the probability that it was drawn from the bag B.

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Exercise Subjective Type Questions

1. 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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2. A die is rolled three times, the p be the probability of getting a large number than the previous number, then the value of 54p is

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3. A car is parked among N cars standing in a row, but at either end. On his return, the owner finds that exactly r of the N places are still occupied. The probability that both the places neighboring his car are empty is

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4. Find the probability of getting an even number when one die is tossed.

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5. An artillery targer 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 at point I to have maximum probability is

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6. There are 6 red and 8 green balls in a bag. 5 balls are drawn at random and placed in a red box. The remaining balls are placed in a green box. What is the probability that the number of red balls in the green box plus the number of green balls in the red box is not a prime number?

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7. An urn contains 'a' green and 'b' pink balls k balls are drawn and laid a side, their colour being ignored. Then one more ball is drawn. Find the probability that it is green.

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8. A fair coin is tossed 12 times. Find the probability that two heads do not occur consectively.

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9. Find the differentiate of $2x + x^2 + 6$ with respect to x.

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10. A chess game between two grandmasters X and Y is won by whoever first wins a total of two games. X's chances of winning or loosing any perticular game are a, b and c, respectively. The games are independent and a+b+c=1.

The probability that Y wins the match after the 4th game, is

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11. Of three independent events, the chance that only the first occurs is a, the chance that only the second occurs is b and the chance of only third is c. if x is a root of the equation $(a + x)(b + x)(c + x) = x^2$, then chance of three events are respectively :

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12. A is a set containing n 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 so that $(P \cup Q)$ is a proper subset of A, is

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13. An electric component manufactured by $'RASU$ electronics' is tested for its defectiveness by a sophisticated testing device. Let A denote the event the device is defective and B the event the testing device reveals the component to be defective. Suppose $P(A) = \alpha.$ and $P\left(\frac{B}{A}\right) = P\left(\frac{B'}{A'}\right) = 1 - \alpha,$ where $0 < \alpha < 1.$ If the probability that the component is not defective is $\lambda.$ then the value of 4λ is

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14. 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 $\frac{2^n}{\hat{} (2n)C_n}$

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15. If m things are distributed among a men and b women, then show that the chances that the number of things received by men is odd are given by $\frac{(b+a)^m - (b-a)^m}{2(b+a)^m}$

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Exercise Questions Asked In Previous 13 Years Exam

1. find the derivative of sin x cos x

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2. 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. $\frac{5}{6}$

C. $\frac{6}{11}$

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

Answer: A

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3. Let A and B be two events such that $P(\overline{A \cup B}) = \frac{1}{6}, P(A \cap B) = \frac{1}{4}$ and $P\overline{A} = \frac{1}{4}$,where $\overline{A}$ stands for complement of event A. then , events A and B are

A. independent but not equally likely

B. mutually exculusive and independent

C. equally likely and mutually exclusive

D. equally likely but not independent

Answer: A

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4. Three houses are available in a locality . Three persons apply for the houses . Each applies for one house without consulting others . The probability that all three apply for same house is

A. $\frac{8}{9}$

B. $\frac{7}{9}$

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

D. $\frac{1}{9}$

Answer: D

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5. A randam variable X has Poisson's distribution with mean 2. Then , $P(X) > 1.5)$ is equal to

A. $1 - \frac{3}{e^2}$

B. $\frac{3}{e^2}$

C. $\frac{2}{e^2}$

D. 0

Answer: A

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6. There are n urns each containing (n+1) balls such that ith urn contains i white balls and (n+1-i) red balls. Let u_i be the event of selecting ith urn, i=1,2,3..., n and w denotes the event of getting a white ball. IfP(u_i)=c, where c is a constant then P(u_n/w) is equal to

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7. In a telephone enquiry system, the number of phone calls regarding relevant enquiry follow poisson distribution with an average of five phone calls during 10-minute time intervals. The probability that there is at the most one phone call during a 10-minute time period is

A. $\frac{6}{5^e}$

B. $\frac{5}{6}$

C. $\frac{6}{55}$

D. $\frac{6}{e^5}$

Answer: D

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8. 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 this wife given that each American man is seated adjacent to his wife is $1/2$ b. $1/3$ c. $2/5$ d. $1/5$

A. $\frac{1}{2}$

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

C. $\frac{2}{3}$

D. $\frac{1}{5}$

Answer: C

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9. Let $H_1, H_2, ..., H_n$ be mutually exclusive events with $P(H_i) > 0, i = 1, 2, ... n.$ Let E be any other event with $0 < P(E)$

Statement I $P(H_i \mid E) > P(E \mid H_i . P(H_i)$ for $i = 1, 2, ... , n$

statement II $\sum_{i=1}^{n} P(H_i) = 1$

A. (a)Statement -1 is true , Statement -2 is true, Statement -2 is a correct explanation for Statement -1

B. (b)Statement -1 is true , Statement -2 is true, Statement -2 is not a correct explanation for Statement -1

C. (c)Statement -1 is true , Statement -2 is false

D. (d)Statement-1 is false, Statement-2 is true

Answer: D

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10. Let E^c denote the complement of an event E. Let E, F, G be pairwise independent events with $P(G) > 0$ and $P(E \cap F \cap G) = 0$ Then $P(E^c \cap F^c \mid G)$ equals

A. $P(E^c) + P(F^c)$

B. $P(E^c) - P(F^c)$

C. $P(E^c) - P(F)$

D. $P(E) - P(F^c)$

Answer: C

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

A. $\frac{1}{729}$

B. $\frac{8}{9}$

C. $\frac{8}{729}$

D. $\frac{8}{243}$

Answer: D

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12. Two aeroplanes I and II bomb a target in succession. The probabilities of I and II scoring a hit correctly are 0.3 and 0.2, respectively. The second plane will bomb only if the first misses the target. The probability that the target is hit by the second plane is (A) 0.06

(B) 0.14 (C) $\frac{7}{22}$ (D) 0.7

A. 0.06

B. 0.14

C. 0.2

D. 0.7

Answer: B

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13. An experiment has 10 equally likely outcomes. Let A and B be two non-empty events of the experiment. If A consists of 4 outcomes, the number of outcomes that B must have so that A and B are independent, is

A. 2,4 or 8

B. 3,6 or 9

C. 4 or 8

D. 5 or 10

Answer: D

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14. Evluate $\int (\cos x + x)\, dx$

A.

B.

C.

D.

Answer: B

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15. A die is thrown. Let A be the event that the number obtained is greater than 3. Let B be the event that the number obtained is less than 5. Then $P(A \cup B)$ is

A. 0

B. 1

C. `(2)/(5)

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

Answer: B

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16. It is given that the events A and B are such that $P(A)=\frac{1}{4}, P\left(\frac{A}{B}\right)=\frac{1}{2} \text{and} p\left(\frac{B}{A}\right)=\frac{2}{3}$. Then P(B) is:

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

B. $\frac{2}{3}$

C. $\frac{1}{2}$

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

Answer: A

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17. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses rerquired.

The probability that $X = 3$ equals

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

B. $\frac{25}{36}$

C. $\frac{5}{36}$

D. $\frac{125}{216}$

Answer: A

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18. A fair die is tossed repeatedly until a 6 is obtained. Let X denote the number of tosses rerquired.

The probability that X ≥ 3 equals

A. $\frac{125}{216}$

B. $\frac{25}{36}$

C. $\frac{5}{36}$

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

Answer: B

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19. 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. $\frac{125}{216}$

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

C. $\frac{25}{36}$

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

Answer: D

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20. In a binomial distribution B $\left(n, p=\frac{1}{4}\right)$, if the probability of at least one success is greater than or equal to $\frac{9}{10}$, then n is greater than

A. $\frac{4}{\log_{10} 4-\log_{10} 3}$

B. $\frac{4}{\log_{10} 4-\log_{10} 3}$

C. $\frac{1}{\log_{10} 4+\log_{10} 3}$

D. $\frac{9}{\log_{10} 4-\log_{10} 3}$

Answer: B

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21. 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

A. $\frac{1}{50}$

B. $\frac{1}{14}$

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

D. $\frac{5}{14}$

Answer: B

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22. 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

A. $\frac{1}{18}$

B. $\frac{1}{9}$

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

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

Answer: C

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23. A signal which can can be green or red with probability $\frac{4}{5}$ and $\frac{1}{5}$ respectively, is received by station A and then transmitted to station B. The probability of each station reciving the signal correctly is $\frac{3}{4}$. If the singal received at station B is green, then the probability that original singal was green is

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

B. $\frac{6}{7}$

C. $\frac{20}{23}$

D. $\frac{9}{20}$

Answer: C

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24. 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 form 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 true , Statement -2 is true, Statement-2 is a correct explanation for Statement -1.

B. Statement -1 is true, Statement -2 is false

C. Statement -1 is false , Statement -2 is true

D. Statement-1 is true, Statement-2 is true, Statement-2 is not a correct explanation for Staement-1.

Answer: B

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25. 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. $\frac{2}{7}$

B. $\frac{1}{21}$

C. $\frac{2}{23}$

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

Answer: A

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26. 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 is

A. $\frac{13}{30}$

B. $\frac{23}{30}$

C. $\frac{19}{30}$

D. $\frac{11}{30}$

Answer: B

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27. 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 is

A. (a) $\frac{17}{23}$

B. (b) $\frac{11}{23}$

C. (c) $\frac{15}{23}$

D. (d) $\frac{12}{23}$

Answer: D

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28. Let E and F be two independent events. The probability that exactly one of them occurs is $\frac{11}{25}$ and the probability if none of them occurring is $\frac{2}{25}$. If $P(T)$ denotes the probability of occurrence of the event T, then

A. $P€ = \frac{4}{5}, P(F) = \frac{3}{5}$

B. $P€ = \frac{1}{5}, P(F) = \frac{2}{5}$

C. $P€ = \frac{2}{5}, P(F) = \frac{1}{5}$

D. $P€ = \frac{3}{5}, P(F) = \frac{4}{5}$

Answer: A::D

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29. 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. $\left(\frac{3}{4}, \frac{11}{12}\right]$

B. $\left[0, \frac{1}{2}\right]$

C. $\left(\frac{11}{12}, 1\right]$

D. $\left(\frac{1}{2}, \frac{3}{4}\right]$

Answer: B

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30. If C and D are two events such that $C \subset DandP(D) \neq 0$, then the correct statement among the following is :

A. $P\left(\frac{C}{D}\right) \geq P(C)$

B. $P\left(\frac{C}{D}\right) < P(C)$

C. $P\left(\frac{C}{D}\right) = \frac{P(D)}{P(C)}$

D. $P\left(\frac{C}{D}\right) = P(C)$

Answer: A

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31. Let A, B, C be pariwise independent events with $P(C) > 0$ and $P(A \cap B \cap C) = 0$. Then $P\left(\frac{A^c \cap B^c}{C}\right)$.

A. $P(A^c) - P(B)$

B. $P(A) - P(B^c)$

C. $P(A^c) + P(B^c)$

D. $P(A^c) - P(B^c)$

Answer: A

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32. A ship is fitted with three engines E_1, E_2 and E_3. The engines function independently of each other with respective probabilities $\frac{1}{2}, \frac{1}{4},$ and $\frac{1}{4}$. 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 function. Which of the following is/are true?

A. $P\left[X_1^c / X\right] = \frac{3}{16}$

B. $P[\text{exactly two engines of the ship are functioning} / X] = \frac{7}{8}$

C. $P[X / X_2] = \frac{5}{16}$

D. $P[X/X_1] = \frac{7}{16}$

Answer: B::D

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33. four fair dice D_1, D_2, D_3 and D_4 each having six faces numbered 1,2,3,4,5 and 6 are rolled simultaneously. The probability that D_4 shows a number appearing on one of D_1, D_2, D_3 is

A. $\frac{91}{216}$

B. $\frac{108}{216}$

C. `(25)/(216)

D. $\frac{127}{216}$

Answer: A

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34. If X and Y are two events such that $PX/Y\Big) = \frac{1}{2}, P(Y/X) = \frac{1}{3}$ and $P(X \cap Y)\frac{1}{6}$. Then, which of the following is/are correct ?

A. $P(X \cup Y) = \frac{2}{3}$

B. X and Y are independent

C. X and Y are not independent

D. $P(X^c \cap Y) = \frac{1}{3}$

Answer: A::B

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

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

C. $\frac{3}{8}$

D. $\frac{1}{5}$

Answer: D

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36. 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. $\frac{13}{3^5}$

B. $\frac{11}{3^5}$

C. $\frac{10}{3^5}$

D. $\frac{17}{3^5}$

Answer: B

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37. Four person independently solve a certain problem correctly with probabilities $\frac{1}{2}, \frac{3}{4}, \frac{1}{4}, \frac{1}{8}$. Then the probability that he problem is solve 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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38. Of the three independent events $E_1, E_2, \text{ and } E_3$, the probability that only E_1 occurs is α only E_2 occurs is β, and only E_3 occurs is γ. Let the probability p that none of events $E_1, E_2, \text{ or } E_3$ occurs satisfy the equations $(\alpha - 2\beta)p = \alpha\beta \text{ and } (\beta - 3\gamma)p = 2\beta\gamma$. All the given

probabilities are assumed to lie in the interval $(0, 1)$. Then

$$\frac{\text{Probability of occurrence of} E_1}{\text{Probability of occurence of} E_3} =$$

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39. 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. $\frac{116}{181}$

B. $\frac{126}{181}$

C. $\frac{65}{181}$

D. $\frac{55}{181}$

Answer: D

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40. A box B_1 contains 1 white ball, 3 red balls and 2 black balls. Another 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, then the probability that all 3 drawn balls are of the same colour , is

A. $\frac{82}{648}$

B. $\frac{90}{648}$

C. $\frac{558}{648}$

D. $\frac{566}{648}$

Answer: A

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41. Let A and B be two events, such that $P(\overline{A \cup B}) = \frac{1}{6}, P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{1}{4}$, where $\overline{A}$ stands for

complement of event A. Then events A and B are :

A. independent but not equally likely

B. independent and equally likely

C. mutually exclusive and independent

D. equally likely but not independent

Answer: A

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42. 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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43. Box 1 contains three cards bearing number 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 and x_3 are in arithmetic progression , is

A. $\frac{29}{105}$

B. $\frac{53}{105}$

C. $\frac{57}{105}$

D. $\frac{1}{2}$

Answer: B

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44. 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 are in an aritmetic progression is

A. $\frac{9}{105}$

B. $\frac{10}{105}$

C. $\frac{11}{105}$

D. $\frac{7}{105}$

Answer: B

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45. If 12 indentical balls are to placed in 3 indntical boxes, then the probability that one of the boxes contains exactly 3 balls is

A. $220\left(\frac{1}{3}\right)^{12}$

B. $22\left(\frac{1}{3}\right)^{11}$

C. $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

D. $55\left(\frac{2}{3}\right)^{10}$

Answer: C

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

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47. 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 number of red and black balls respectively , in box II.

A ball is drawn random frombox I and transferred to box II. If the

probability of drawing a red ball from box I, after this transfer is $\frac{1}{3}$, then correct option(s) with 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: B

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48. There are two bags I and II . Bag I contains 4 white and 3 red balls and bag II contains 6 white and 5 red balls. One ball is drawn at random from one of the bags and is found to be red. Find the probability that it was drawn from bag II.

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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49. Let two fair 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_3 are independent

D. E_1 and E_2 are independent

Answer: C

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50. 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 the 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. $\frac{78}{93}$

D. $\frac{75}{83}$

Answer: C

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51. 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 team gets 3 points for a win. 1 point for a draw and 10 pont 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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52. 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. $\frac{11}{36}$

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

C. $\frac{13}{36}$

D. $\frac{1}{2}$

Answer: C

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53. 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

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54. If two different numbers are taken from the set {0, 1, 2, 3, ..., 10}, then the probability that their sum as well as absolute difference are both multiples of 4, is

A. $\frac{7}{55}$

B. $\frac{6}{55}$

C. $\frac{12}{55}$

D. $\frac{14}{45}$

Answer: C

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55. 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) $= \frac{1}{6}$. Then the probability that at least one of the events occurs, is : $\frac{7}{64}$ (2) $\frac{3}{16}$ (3) $\frac{7}{32}$ (4) $\frac{7}{16}$

A. $\frac{3}{16}$

B. $\frac{7}{32}$

C. $\frac{7}{16}$

D. $\frac{7}{64}$

Answer: C

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