MATHS

BOOKS - ACCURATE PUBLICATION

PROBABILITY

Questions Carrying Type 4 Example

1. In a single throw of three dice, determine the probability of getting

(i) a total of 5

(ii) a total of at most 5

(iii) a total of at least 5 .

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2. In a single throw of two dice, find the probability of total of 9 or 12.

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3. In a single throw of two dice, find the probability of getting a total of 11 or 12.

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4. If P (A) $=\frac{1}{3}$, $P(B)=\frac{1}{5}$ and $P(\cup B)=\frac{11}{30}$ then find P (A| B).

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5. If P(A) = $\frac{5}{13}$, P (B) = $\frac{9}{13}$ and $P(A \cup B)=\frac{12}{13}$ then find P (A|B).

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6. If P (A) = $\frac{8}{20}$, $P(B)=\frac{7}{20}$ and P $(A \cup B)=\frac{11}{20}$ then find P (A | B).

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7. If P (E) = $\frac{1}{20}$, P (F) = $\frac{3}{50}$ and P $(E \cup F) = \frac{2}{25}$ then find P (E |F).

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8. Evaluate $P(A \cup B)$, if $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$.

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9. If $2P(A) = P(B) = \frac{6}{13}$ and $P(A/B) = \frac{1}{3}$ then find $P(A \cup B)$.

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10. If $2P(A) = P(B) = \frac{7}{15}$ and $P(A/B) = \frac{2}{7}$ then find $P(A \cup B)$.

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11. If $P(A) = 3P(B) = \frac{5}{7}$ where A and B are independent events then find $P(A \cup B)$ and $P\left(\frac{A}{B}\right)$.

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12. The events A and B are given to be independent . Find P(B), If it is given that $P(A) = 0.35$ and $P(A \cup B) = 0.60$

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13. If A and B are two independent events such that $P(A \cup B) = 0.6$ and $P(A) = 0.2$ find P(B).

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14. If $P(A) = 0.2, P(A \cup B) = 0.5,$ find P(B). Here A and B are independent events .

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15. If A and B are independent events, $P(A) = 0.3$ and $P(B) = 0.4$ then find $P(A \cup B)$, $P\left(\frac{A}{B}\right)$ and $P\left(\frac{B}{A}\right)$.

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16. A and B appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that both selected

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17. A and B appeared for an interview. The probability of their selection is $\frac{1}{4}$ and $\frac{1}{5}$ respectively. Find the probability that both selected

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18. A and B appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{4}$ respectively. Find the probability that both selected

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19. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that exactly one of them solves the problem.

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20. Probability of A, B and C of solving a problem are $\frac{1}{5}, \frac{1}{6}$ and $\frac{1}{3}$ espectively. If they all try to solve the problem then find the probability that exactly one of them will solve the problem.

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21. Probabilities of A, B and C of solving a problem are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. If they all try to solve the problem then find the probability that exactly one of them will solve the problem.

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22. Probabilities of A, B and C of solving a problem are $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{5}$ respectively. If they all try to solve the problem then find the probability that exactly one of them will solve the problem.

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23. A problem is given to three students, whose chances of solving it are : $\frac{1}{4}, \frac{1}{3}$ and $\frac{1}{2}$ respectively. Find the probability that exactly one of them may solve it.

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24. A problem is given to three students, whose chances of solving it are : $\frac{1}{3}, \frac{1}{2}$ and $\frac{1}{5}$ respectively. Find the probability that exactly one of them may solve it.

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25. A problem is given to three children, whose chances of solving it are $\frac{1}{3}$, 1/4 and 1/5`, what is the probability that : Only one of them solves it correctly

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26. A problem is given to three children whose chances of solving the problem are $\frac{1}{3}, \frac{1}{5}$ and $\frac{1}{6}$

What is the probability

(i) at least one of them solve it ?

(ii) only one of them solve it correctly ?

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27. A problem in Mathematics is given to three students whose chances of solving it are : $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{5}$. What is the probability that at least one of them may solve it?

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28. A problem of mathematics is given to three students whose chances of solving it are $\frac{1}{3}, \frac{1}{4}$ and $\frac{1}{5}$ and respectively. What is the probability that the problem will be solved .

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29. A problem is given to three students, whose chances of solving it are : $\frac{1}{3}, \frac{1}{5}$ and $\frac{1}{6}$ respectively. Find the probability than exactly one of them may solve it.

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30. The probability of A and B achieving a target is $\frac{3}{4}$ and $\frac{5}{6}$ respectively. If both of them try then find the probability that at least one of them will achieve the target

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31. The probability of A and B achieving a target is $\frac{3}{4}$ and $\frac{5}{6}$ respectively. If both of them try then find the probability that at least one of them will achieve the target

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32. The probability of A and B achieving a target is $\frac{1}{2}$ and $\frac{3}{5}$ respectively. If both of them try then find the probability that at least one of them will achieve the target.

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33. Probability of solving specific problem independently by A, B and C are $\frac{3}{7}, \frac{1}{3}$ and $\frac{2}{5}$ respectively. If all of them try to solve the problem independently then find the probability that problem will be solved.

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34. Probability of solving specific problem independently by A, B and C are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{5}$ respectively. If all of them try to solve the problem independently then find the probability that problem will be solved.

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35. Probabilities of A, B and C of solving a problem are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively. If they all try to solve the problem then find the probability that exactly one of them will solve the problem.

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36. A bag A contains 8 white and 7 black balls while the other bag B contains 5 white and 4 black balls. One ball is randomly picked up from the bag A and mixed up with the balls in the bag B. Then a ball is randomly drawn out from it. Find the probability that the ball drawn is white.

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37. A bag 'A' contains 5 red and 7 blue balls, while the other bag 'B' contains 7 red and 4 blue balls. A ball is transferred (without noticing its colour) from the bag 'A' to the bag 'B' . Then a ball is drawn from bag 'B' . Find the probability that the ball drawn is blue .

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38. one bag contains 6 white and 5 black balls. Another bag contains 5 white and 3 black balls. One ball at random is transferred from the first

bag to the second bag and then a ball is drawn from the second bag. Find the probability that the ball drawn is white .

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39. Bag I contains 5 red and 3 black balls and bag 11 contains 6 red and 5 black balls. One bag is chosen at random and a ball is drawn from it, which is found to be black. Find the probability that it is drawn from bag I.

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40. Two bags contain : 4 red and 4 black. 2 red and 6 black balls One ball is drawn at random from one of the bags and found to be red. Find the probability that it was drawn from the second bag.

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41. Bag A contains 6 red and 4 black balls . One ball is drawn at random from the bag. Find the probability that it was a red ball.

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42. Bag I contains 4 red and 5 black balls, Bag II contains 7 red and 9 black balls. One bag is chosen at random and a ball is drawn which is found to be black. Find the probability that it was drawn from Bag I.

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43. There are two bags I and II . Bag I contains 3 white and 2 red balls and Bag II contains 5 white and 4 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 .

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44. 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.

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45. Bag I contains 5 red and 6 black balls, Bag II contains 4 red and 7 black balls. One bag is chosen at random and a ball is drawn which is found to be red. Find the probability that it was drawn from Bag II.

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46. A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bags is selected at random and a ball is drawn from the bag which is found to be red. Find the probability that the ball is drawn from the first bag.

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47. Bag I contains 3 red and 4 black balls while another Bag II contains 5 red and 6 black balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that it was drawn from Bag II.

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48. Bag I contains 4 black and 6 red balls, bag II contains 7 black and 3 red balls and bag III contains 5 black and 5 red balls. One bag is chosen at random and a ball is drawn from it which is found to, be red. Find the probability that the ball is drawn from bag II.

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49. Bag I contains 2 black and 8 red balls, bag II contains 7 black and 3 red balls and bag III contains 5 black and 5 red balls. One bag is chosen at

random and a ball is drawn from it which is found to be red. Find the probability that the ball is drawn from bag II.

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50. Bag I contains 4 black and 6 red balls, bag II contains 7 black and 3 red balls and bag III contains 5 black and 5 red balls. One bag is chosen at random and a ball is drawn from it which is found to, be red. Find the probability that the ball is drawn from bag II.

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51. Bag I contains 3 red and 5 white balls and bag 11 contains 4 red and 6 white balls. One of the bags is selected at random and a ball is drawn from it. The ball is found to be red. Find the probability that ball is drawn from bag 11

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52. Bag I contains 4 red and 6 white balls and bag Il contains 3 red and 7 white balls. One of the bags is selected at random and a ball is drawn from it. The ball is found to be white. Find the probability that ball is drawn from bag I.

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53. Bag I contains 5 red and 7 white balls and bag 11 contains 4 red and 8 white balls. One of the bags is selected at random and a ball is drawn from it. The ball is found to be red. Find the probability that ball is drawn from bag II.

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54. 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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55. In a tape recorder factory, three machines A, B and C produced 50%, 30% and 20% of total production. The percentage of the defective output of these machines are 3%, 4% and 5% respectively. A tape recorder is selected randomly and found to be defective, find the probability that it is produced by machine A.

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56. In a tape recorder factory, three machines A, B and C produced 40%, 30% and 20% of total production. The percentage of the defective output of these machines are 2%, 3% and 4% respectively. A tape recorder is selected at random and found to be defective. Find the probability that tape recorder is produced by machine C.

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57. In a bolt factory, three machines A, B and C manufacturers $25, 35$ and 40 percent of the total bolts . Of their output $5, 4$ and 2 percent are defective respectively. A bolt is drawn at random and found to be defective. Find the probability that it was manufactured by machine B.

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58. 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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59. A man is known to speak the truth 4 times out of 5 times. He throws a fair die and reports that it is 2. Find the probability that it is actually a 2.

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60. A man is known to speak the truth 2 times out of 3 times. He throws a fair die and reports that it is .4. Find the probability that it is actually a 4.

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61. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers . The probability of an accident involving a scooter, car and a truck is $\frac{1}{100}, \frac{3}{100}$ and $\frac{3}{20}$ respectively . One of the insured persons meets with an accident. What is the probability that he is a (i) scooter driver (ii) car driver and (iii) truck driver ?

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

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

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64. Find the Probability distribution of the number of heads when three coins are tossed.

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65. A coin is tossed 4 times. X is the number of heads observed. Find the probability distribution of X .

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66. Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find probability distribution table and mean of number of kings.

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67. Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find probability distribution and mean of number of cards numbered 2

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68. Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find probability distribution and mean of number of cards n umbered 4 .

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69. One card is drawn from a well-shuffled deck of 52 cards. Find probability that the card is a king.

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70. A die is tossed twice. If getting a number 3 or 4 is considered a success. Find the probability distribution of the number of successes.

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71. A die is tossed twice. If getting a number 3 or 4 is considered a success. Find the probability distribution of the number of successes.

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72. A die is tossed twice. If getting a number 2 or 3 is considered a success. Find the Probability distribution of the number of successes.

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73. A die is tossed twice. If getting a number 3 or 4 is considered a success. Find the probability distribution of the number of successes.

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74. Find the probability distribution of the number of successes in two tosses of a die, where a success is defined as : number greater than 4

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75. Find the probability distribution of number of successes in 2 tosses of a fair die where success is defined as the number obtained is greater than 5.

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76. Find the probability distribution of number of successes in 2 tosses of a fair die where success is defined as the number obtained is greater than 3.

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77. Find the probability distribution of the number of tails when three coins are tossed simultaneously.

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Questions Carrying 1 Mark Type 1 Multiple Choice Questions

1. If $P(A) = \frac{1}{5}, P(B) = \frac{3}{10}$ and $P(A \cap B) = \frac{3}{25}$, then find

(i) $P(A/B)$

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

A. $\frac{1}{25}$

B. $\frac{19}{25}$

C. $\frac{19}{50}$

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

Answer: C

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2. The chance of getting a doublet with two dice is :

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

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

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

D. $\frac{5}{36}$

Answer: B

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3. If $P(A) = 2/5, P\{B) = 1/5$ and $P(A \cup B) = 3/5$, then $P(A/B)$ equals :

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

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

C. 0

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

Answer: C

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4. If $P(A) = 3/5, P\{B) = 1/5$ and $P(A \cup B) = 4/5$, then $P(A/B)$ equals :

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

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

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

D. 0

Answer: D

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

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

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

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

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

Answer: A

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6. If $P(A) = \frac{4}{5}$ and $P(A \cap B) = \frac{1}{5}$, then $P\left(\frac{B}{A}\right)$ is equal to :

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

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

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

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

Answer: A

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7. If $P(A) = \frac{1}{2}, P(B) = \frac{3}{8}$ and $P(A \cap B) = \frac{1}{5}$· then P(A/B) is equal to :

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

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

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

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

Answer: B

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8. If $P(A) = \frac{1}{3}, P(B) = \frac{3}{5}$ and $P(A \cap B) = \frac{1}{5}$. then `P(A/B) is equal to :

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

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

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

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

Answer: D

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9. If $P(A) = \frac{3}{5}, P(B) = \frac{1}{5}$ find $P(A \cap B)$ if A and B are independent events.

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

B. $\frac{25}{3}$

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

D. $\frac{3}{25}$

Answer: D

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10. If A and B are independent events and if $P(A) = \frac{1}{2}, P(B) = \frac{2}{5}, then$P(A cap B)` is equal to :

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

B. $\frac{25}{3}$

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

D. $\frac{3}{25}$

Answer: A

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11. If E and F are independent events, $P(E) = \frac{1}{2}$ and $P(F) = \frac{1}{3}$, then $P(E \cap F)$ is :

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

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

C. 0

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

Answer: D

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12. If $P(A) = \frac{1}{2}, P(B) = 0$ then $P(A \mid B)$ is :

A. 0

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

C. not defined

D. 1

Answer: C

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

A. $A \subset B$ but A $\neq B$

B. A= B

C. $A \cap B = \phi$

D. P (A) = P (B)

Answer: D

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14. If A and B are two events such that $P(A) \neq 0$ and $P\left(\frac{B}{A}\right) = 1$, then

A. $A \subset B$

B. $B \subset A$

C. $B = \phi$

D. $A = \phi$

Answer: A

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15. If $P\left(\frac{A}{B}\right) > P(A)$, then which of the following is correct : :

A. $P(B \mid A) < P(B)$

B. $P(A \cap B) < P(A).\, P(B)$

C. $P(B \mid A) > P(B)$

D. $P(B \mid A) = P(B)$

Answer: C

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16. If A and B are any two events such that : $P(A) + P(B) - P(A \text{ and } B)$ = P(A)`, then

A. P (B | A) = 1

B. P (A | B) =1

C. P (B| A) =0

D. P (A| B) =0

Answer: B

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17. If A and B are two events such that $A \subset B$ and $P(B) \neq 0$, then which of the following is correct?

A. P(A | B) = $\frac{P(B)}{P(A)}$

B. $P(A \mid B) < P(A)$

C. $P(A \mid B) \geq P(A)$

D. None of these

Answer: C

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18. If P (A) = 0.2 , P (B) = 0.6 , find P (A ∪ B) . where A and B are independent events.

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19. If P (E) denotes probability prime number in dice.Find its value.

A. P (E) $\in$ [-1,1]

B. $P(E) \in (1, \infty)$

C. $P(E) \in (0, 1)$

D. $P(E) \in [0, 1]$

Answer: D

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20. If E is any event then P (E) belongs to

A. [0,1]

B. (0,1)

C. [-1,1]

D. (-1,1)

Answer: A

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21. If $P(A) = 0.2, P(B) = 0.4, P(A \cup B) = 0.6$, then $P(A/B)$ is equal to

A. 0.8

B. 0.5

C. 0.3

D. 0

Answer: D

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22. If A and B are events such that P(A) = 0·4, P(B) = 0.8 and P(B/A) = 0·6, then $P(A \cap B)$ is :

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

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

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

D. $\frac{6}{7}$

Answer: C

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23. If A and B are independent events such that $0 < P(A) < 1$ and $0 < P(B) < 1$ then which of the followingis not correct ?

A. A and B are mutually exclusive

B. A' and B are independent

C. A and B' are independent

D. A' and B' are independent

Answer: A

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24. Let X be a discrete random variable. The probaility distribution of X is given below:

X	30	10	−10
P (X)	$\frac{1}{5}$	$\frac{3}{10}$	$\frac{1}{2}$

The E (X) is equal to

A. 6

B. 4

C. 3

D. -5

Answer: B

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25. Let 'X' be a discrete random variable assuming values $x_1, x_2, \ldots\ldots\ldots x_n$ with probabilities $p_1, p_2, \ldots\ldots\ldots, p_n$ respectively. Then variance of 'X' is given by :

A. $E\left(X^2\right)$

B. $E\left(X^2\right)+E(X)$

C. $E\left(X^2\right)-[E(X)]^2$

D. $\sqrt{E\left(X^2\right)-[E(X)]^2}$

Answer: C

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26. If P (A) $=\frac{4}{5}$ and P $(A \cap B)=\frac{7}{10}$, then P (B | A) is equal to

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

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

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

D. $\frac{17}{20}$

Answer: C

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27. If P $(A \cap B) = \frac{7}{10}$ and P (B) = $\frac{17}{20}$ then P (A | B) equals

A. $\frac{14}{17}$

B. $\frac{17}{20}$

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

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

Answer: A

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28. If P (A) = $\frac{3}{10}$, $P(B) = \frac{2}{5}$ and P (B) = $\frac{2}{5}$ and P$(A \cup B) = \frac{3}{5}$ then P (B | A) + P (A| B) equals

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

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

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

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

Answer: D

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29. If P (A) = $\frac{2}{5}$, P (B) =$\frac{3}{10}$ and P $(A \cap B) = \frac{1}{5}$, then P (A| B) . P (B | A) is equal to

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

B. $\frac{5}{7}$

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

D. 1

Answer: C

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30. If A and B are two events such that P (A) = $\frac{1}{2}$, $P(B) = \frac{1}{3}m$, P(A|B) = $\frac{1}{4}$ then P (A $\cap B$) equals .

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

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

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

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

Answer: C

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31. If P (A) =0.4 , P (B) =0.8 and P (B |A) = 0.6 then P (A U B) is equal to

A. 0.24

B. 0.3

C. 0.48

D. 0.96

Answer: D

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32. If A and B are two events such that $P(A) \neq 0$ and $P\left(\frac{B}{A}\right) = 1$, then

A. $P(A \mid B) = P(A).\, P(B)$

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

C. $P(A \mid B).\, P(B \mid A) = 1$

D. $P(A \mid B) = P(A) \mid P(B)$

Answer: B

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33. A and B are events such tahtP (A) = 0.4 , P (B) = 0.3 and P (A $\cup$ B) =0.5 .

Then P (B $\cap A$) equals

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

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

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

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

Answer: D

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34. You are given that A and B are two events such that P (B) = $\frac{3}{5}$, $P(A \mid B) = \frac{1}{2}$ and P $(A \cup B) = \frac{4}{5}$, then P (A) equals

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

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

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

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

Answer: C

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35. You are given that A and B are two events such that P (B) = $\frac{3}{5}$, P (A|B) = $\frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$ then P (B |A) is equal to

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

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

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

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

Answer: D

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36. If P (B) = $\frac{3}{5}P(A \mid B) = \frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$ then P $(A \cup B)$'+ P (A' $\cup B$)=

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

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

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

D. 1

Answer: D

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37. If $P(A) = \frac{7}{13}, P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$. then `P(A/B) is equal to :

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

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

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

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

Answer: D

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38. If A and B are such events that P (A) > 0 and P (B) $\neq 1$, then P (A' |B) equals

A. 1 - P (A | B)

B. 1 - P (A |B)

C. $\frac{1 - P(A \cup B)}{P(B)}$

D. $P(A) \mid P(B)$

Answer: C

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39. If and B are two independent events with P (A) $= \frac{3}{5}$ and P (B) = $\frac{4}{9}$ then P (A $\cap$ B) equals

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

B. $\frac{8}{45}$

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

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

Answer: D

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40. If two events are independent then

A. they must be mutually exclusive

B. the sum of their probabiolities must be equal to 1

C. `(a) and (b) both are correct

D. None of the above is correct

Answer: D

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41. Let A and B be two events such that 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. $\frac{2}{5}$

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

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

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

Answer: D

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42. Two events A and B are independent if $P(A \cap B)$ = _____

A. P (A) + P (B)

B. P (A) - P (B)

C. P (A) . P (B)

D. P (A) | P(B)

Answer: C

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43. Two events E and F are independent . If P (E) =0.3 , P (E $\cup F) = 0.5$ then P (E | F) - P (F |E) equals

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

B. $\frac{3}{35}$

C. $\frac{1}{70}$

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

Answer: C

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44. The probability distribution of a discrete random variable X is given below :

X	2	3	4	5
P(X)	$\frac{5}{k}$	$\frac{7}{k}$	$\frac{9}{k}$	$\frac{11}{k}$

The value of k is

A. 8

B. 16

C. 32

D. 48

Answer: C

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Questions Carrying Type Ii Fill In The Blanks Questions

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

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2. If P(A)= $\frac{2}{7}$, $PB = \frac{3}{7}$, and P (A $\cap$ B) =$\frac{5}{7}$, then P(A/B) equal...

Watch Video Solution

3. If $P(A) = \frac{1}{2}, P(B) = \frac{3}{8}$ and $P(A \cap B) = \frac{1}{5}$· then `P(B/A) is equal to :

Watch Video Solution

4. If A and B are independent events and if $P(A) = \frac{1}{2}, P(B) = \frac{2}{5}, then$ P(A cap B)` is equal to :

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5. Probability that A speaks truth is $\frac{4}{5}$. A coin is tossed. A reports that a head appears. The probability that actually there was head is

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6. If A and B are independent events such that P (A) =p, P (B)=2 p and P (Exactly one of A, B)= $\frac{5}{9}$ then find p

Watch Video Solution

7. If A and B are independent events then P (A $\cup B$) =1 ..... .

Watch Video Solution

8. If A and B are two events such that P (A |B) = p , P (A)=p, P (B) = (1)/(3) and $p(A \cup B) = \frac{5}{9}$ then p = ...

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9. If A and B are such that P$(A' \cup B') = \frac{2}{3}$ and P$(A \cup B) = \frac{5}{9}$, then P(A') + P(B') = ...

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10. Let A and B be two events . If P (A |B) = P (A) then A is ..... of B .

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Questions Carrying Type Iii True Or False Questions

1. State whether it is ture or false: If A and B are independent events then P(A nn B) = P(A) + P(B).

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2. Three events A, B and C are said to be independent if P($A \cap B \cap C$)= P(A) P(B) P(C).

Watch Video Solution

3. One of the condition of Bernoulli trials is that the trails are independent of each other.

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4. Let P (A) > 0 and P $(B) > 0$. Then A and B can be both mutually exclusive and independent."

Watch Video Solution

5. If A and B are independent events, then A' and B' are also independent.

Watch Video Solution

6. Two events A and B will be independent, if:

Watch Video Solution

7. Two independent events are always mutually exclusive.

Watch Video Solution

8. If A and B are two independent events then P (A and B) = P(A). P(B).

Watch Video Solution

9. If A and B are independent events, then $P(A' \cup B) = 1 - P(A)P(B')$.

Watch Video Solution

10. If A and B are independent, then P (exactly one of A, B occurs) = P(A) P (B') + P(B)P(A').

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11. If A and B are two events such that $P(A) > 0$ and $P(A) + P(B) > 1$, then $\mathrm{P}(B \mid A) \geq 1 - \frac{P(B')}{P(A)}$.

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12. If A, B and C are three independent events such that P (A)=P(B) =PC) = p, then P(At least two of A, B, C occur) - $3p^2 - 2p^3$.

Watch Video Solution

13. Three coins are tossed simultaneously. Find the sample space.

Watch Video Solution

14. Two or more events associated with a random experiment are said to be mutually exclusive if the occurrence of any one of them prevents the occurrence of all others.

Watch Video Solution

15. If $P(A) = \frac{1}{5}, P(B) = \frac{3}{10}$ and $P(A \cap B) = \frac{3}{25}$, then find

(i) $P(A/B)$

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

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16. If $P(A) = \frac{1}{2}, P(B) = 0$ then $P(A \mid B)$ is :

Watch Video Solution

17. If A and B are independent events, then $P(A' \cup B) = 1 - P(A)P(B')$.

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18. Let $\{E_1, E_2, \ldots, E_n, \}$ be a partition of the sample space S, and suppose that each of the events $E_1, E_2 \ldots . , E_n$, has non-zero probability of occurrence. Let A be any event associated with S, then P(A) = $P(E_1)P(A \mid E_1) + P(E_2)P(A \mid E_2) + \ldots + P(E_n)P(A \mid E_n)$

Watch Video Solution

19. Let $\{E_1, E_2, \ldots, E_n, \}$ be a partition of the sample space S, and suppose that each of the events $E_1, E_2 \ldots . , E_n$, has non-zero probability of occurrence. Let A be any event associated with S, then P(A) = $P(E_1)P(A \mid E_1) + P(E_2)P(A \mid E_2) + \ldots + P(E_n)P(A \mid E_n)$

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20. Let X denote the number of hours you study during a randomly selected school day. The probability that X can take the values x, has the

following form, where k is some unknown constant.:

$$P(X=x)=\begin{cases}0.1 & \text{if} \quad x=0\\ kx & \text{if} \quad x=1 \text{ or } 2\\ k(5-x) & \text{if} \quad x3 \text{ or } 4\\ 0 & otherwise\end{cases}$$ Find the value of k.

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21. State true or false for the following statements :

The random variable X has probability distribution P(X) of the following form, where k is some number:

$$P(X)=\begin{cases}k, & \text{if} \quad x=0\\ 2k, & \text{if} \quad x=1\\ 3k, & \text{if} \quad x=2\\ 0, & \text{otherwise}\end{cases}$$ Then k = 6

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Questions Carrying Type 4 Marks

1. If $P(A)=\frac{6}{11}, P(B)=\frac{5}{11}$ and $P(A\cup B)=\frac{7}{11}$ find :

(i) $P(A\cap B)$

(ii) $P(A/B)$ and

(iii) $P(B/A)$

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2. A bag contains 3 red and 7 black balls. Two balls are selected at random without replacement . If the second selected is given to be red, what is the probability that the first selected is also red ?

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3. Assume that each child born is equally likely to be a boy or a girl. If a family has two children, what is the conditional probability that both are girls? Given that (i) the youngest is a girl, (ii) at least one is a girl.

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4. A couple has two children, find the probability that both children are females, if it is known that the elder childis a female.

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5. If P(A)=0.38, P(A $\cup$ B) - 0.69, find P(B), if A and B are independent events.

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6. For two events A and B, let $P(A) = 0.4$ and $P(B) = p$ and $P(A \cup B) = 0.6$

(i) Find p, so that A and B are independent events.

(ii) Find p, so that A and B are matually exclusive events .

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7. An urn contains 4 red and 7 blue balls . Two balls are drawn at random with replacement . Find the probability of getting

(i) 2 red balls

(ii) 2 blue balls

(iii) one red and one blue ball.

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8. The probabilities of two students A and B coming to the school in time are $\frac{3}{7}$ and $\frac{5}{7}$ respectively. Assuming that the events, 'A coming in time' and 'B coming in time' are independent, find the probability of only one of them coming to the school in time. Write at least one advantage of coming to school in time.

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9. Rishav and Mahesh appeared for an interview. The probability of their selection is $\frac{1}{3}$ and $\frac{1}{5}$ respectively . Find the probability .

(i) both selected

(ii) only one of them selected

(iii) neither of them selected .

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10. A speaks truth in 75% of cases and B in 80% of cases. The percentage of cases theyare likely to contradict each other in stating the same acr, is

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11. A speaks truth in 70% of the cases and B in 80% of the cases. In what percent of cases are they likely to agree in stating the fact ? Do you think, when they agree mean both are speaking truth ?

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12. Probability of A, B and C of solving a problem are $\frac{1}{5}, \frac{1}{6}$ and $\frac{1}{3}$ espectively. If they all try to solve the problem then find the probability that exactly one of them will solve the problem.

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13. The probability of A hitting a target is $\frac{4}{5}$ and that of B hitting it is $\frac{2}{3}$. They both fire at the target . Find the probability that : only one of them will hit the target.

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14. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. If both try to solve the problem independently, find the probability that the problem is solved.

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15. A and B toss a coin alternately till one of them tosses a head and wins the game. If A starts the game, find their respective probability of winning.

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16. A and B throw two dice simultaneously turn by turn. A will win if he throws a total of 5, B will win if he throws a doublet. Find the probability that B will win the game, though A started the game .

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

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18. There are two bags I and II. Bag I contains 4 white and 3 red balls while another Bag II contains 3 white and 7 red balls. One ball is drawn at random from one of the bags and it is found to be white. Find the probability that it was drawn from Bag I.

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19. There are two bags I and II . Bag I contains 3 white and 2 red balls and Bag II contains 5 white and 4 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 .

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20. Bag I contains 4 red and 5 black balls and bag II contains 3 red and 4 blacks balls. One ball is transferred from bag I to bag II and then two balls are drawn at random (without replacement) from bag II. The balls so

drawn are both found to be black. Find the probability that the transferred ball is black.

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21. In a set of 10 coins, 2 coins with heads on both sides. A coin is selected at random from this set and tossed five times. Of all the five times, the result was head, find the probability that the selected coin had heads on both sides.

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22. Of the students in a college, it is known that 60% reside in hostel and 40% are day scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain A grade and 20% of day scholars attain A grade in their annual examination. At the end of the year, one student is chosen at random from the college and he has an A grade, what is the probability that the student is a hostlier?

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23. 40% students of a college reside in hostel and the remaining reside outside. At the end of the year, 50% of the hostlers got A grade while from outside students, 30% got A grade in the examination. At the end of the year, a student of the college was chosen at random and was found to have gotten A grade. What is the probability that the selected student was a hostler ?

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24. Suppose that 5% of men and 0.25% of women have grey hair. A grey haired person is selected at random. What is the probability of this person being male? Assume that there are equal number of males and females.

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25. Assume that the chances of a patient having a heart attack is 40%. It is also assumed that a meditation and yoga course reduce the risk of heart attack by 30% and prescription of certain drug reduces its chances by 25%. At a time a patient can choose any one of the two options with equal probabilities. It is given that after going through one of the two options the patient selected at random suffers a heart attack. Find the probability that the patient followed a course of meditation and yoga?

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26. Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes the numbers of heads. If she gets 1,2,3, or 4, she tosses a coin once and notes whether a head or a tail is obtained. If she attained exactly one head what is the probability that she threw 1,2,3, or 4 with the die?

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

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28. A man is known to speak the truth 4 times out of 5 times. He throws a fair die and reports that it is 2. Find the probability that it is actually a 2.

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29. There see three coins,one is a two headed coin (having head on both the faces),another is a biased coin that comes up heads 75% of the time and the third is anunbiased coin.One of the three coins is choosen at random and tossed.Of it shows head,what is probability that it was the two headed coin?

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30. In a factory which manufactures bolts, machines A, B and C manufacture respectively 30%, 50% and 20% of the bolts. Of there outputs 3, 4, 1 percent respectively are defective bolts. A bolt is drawn at random from the product and is found to be defective. Find the probability that this is not manufactured by machine B.

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31. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accidents are 0.01, 0.03 and 0.15 respectively. One of the insured persons meets with an accident. What is the probability that he is a scooter driver?

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32. In a group of 400 people, 160 are smokers and non-vegetarian, 100 are smokers and vegetarian and the remaining are non-smokers and vegetarian. The probabilities of getting a special chest disease are 35%,

20% and 10% respectively. A person is chosen from the group at random and is found to be suffering from the disease. What is the probability that the selected person is smoker and non vegetarian ?

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33. A random variable X has the following probability distribution:

X	0	1	2	3	4	5	6	7
P(X)	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2+k$

Determine

(i) k (ii) P (X $<$ 3) (iii) $P(X > 6)$ (iv) $P(0 < X < 3)$

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34. Two cards are drawn successively with replacement from a well-shuffled deck of 52 cards. Find the probability distribution of the number of aces.

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35. A urn contains 4 white and 6 red balls. Four balls are drawn at random (without replacement) from the urn. Find the probability distribution of the number of white balls.

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36. From a lot of 10 bulbs which include 3 defectives, a sample of 2 bulbs is drawn at random. Find the probability distribution of the number of defective bulbs.

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37. Find the probability distribution of number of doublets in three throws of a pair of dice.

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38. In a group of 30 scientists working on an experiment, 20 never commit error in their work and are reporting results elaborately. Two scientists are selected at random from the group. Find the probability distribution of the number of selected scientists who never commit error in work and reporting.

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39. Find the probability distribution of number of doublets in three throws of a pair of dice.

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40. Two cards are drawn successively with repalcement from a well-shuffled pack of 52 cards. Find the probability distribution of the number of kings and hence find the mean of the distribution .

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41. Three cards are drawn successively with replacement from a well shuffled pack of 52 cards. Find the probability distribution of the number spades.

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42. A class has 15 students whose ages are 14, 17, 15, 14, 21, 17, 19, 20, 16, 18, 20, 17, 16, 19 and 20 years. One student is selected in such a manner that each has the same chance of being chosen and the age X of the selected student is recorded. What is the probability distribution of the random variable X? Find mean, variance and standard deviation of X.

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Sample Question Paper I Solved Section A

1. Function f : R $\rightarrow R$ f(x) = 3 x -5 is

A. One - one only

B. Onto only

C. One -one and onto

D. None of these

Answer: C

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2. Relation given by $R = \{(1, 1), (2, 2), (1, 2), (2, 1)\}$ in the set $A = \{1, 2\}$ is :

A. Reflexive only

B. Symmetric only

C. Transitive only

D. Equivalence relation

Answer: D

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3. $\cos^{-1}\left(-\cos\frac{2\pi}{3}\right)$ is equal to :

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

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

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

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

Answer: D

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4. If $\begin{bmatrix}1 & -x\\ 4 & -3\end{bmatrix} = \begin{bmatrix}1 & 8\\ 4 & -3\end{bmatrix}$ then value of x is :

A. 8

B. -4

C. 3

D. -8

Answer: D

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5. If order of matrix A is 2×3 and order of matrix B is 3×5, then order of matrix B 'A' is :

A. 5×2

B. 2×5

C. 5×3

D. 3×2

Answer: A

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6. If 'f(x)= {[Kx+1,xle5],[3x-5,x>5]:}' is continuous at x=5 then value of k is :

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

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

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

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

Answer: A

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7. $\frac{d}{dx}\left\{\tan^{-1}(e^x)\right\}$ is equal to :

A. $e^x \tan^{-1} e^x$

B. $\frac{e^x}{1+e^{2x}}$

C. 0

D. $e^x \sec^{-1} x$

Answer: B

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8. Slope of tangent to the curve 'y = x^2-2x+1' at x=3 is :

A. 4

B. 6

C. 0

D. 2

Answer: A

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9. $\int 3x^2 dx$ is equal to :

A. x+c

B. $x^2 + c$

C. $x^3 + c$

D. $x^4 + c$

Answer: C

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10. $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{1}{2}} x}{\sin^{\frac{1}{2}} x + \cos^{\frac{1}{2}} x} dx$ is equal to :

A. 0

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

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

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

Answer: D

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11. Degree of differential equation $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 3y = 0$ is :

A. 3

B. 2

C. 1

D. 0

Answer: C

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12. If $\vec{a} \cdot \vec{b} = \left|\vec{a} \times \vec{b}\right|$, then angle between vector $\vec{a}$ and vector $\vec{b}$ is :

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

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

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

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

Answer: C

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13. If $\vec{a} . \vec{b} = 0$ then angle between vector veca and vecb is:

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

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

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

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

Answer: A

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14. Direction ratios of line given by line $\frac{x-1}{3} = \frac{2y+6}{12} = \frac{1-z}{-7}$ are :

A. $< 3, 12, -7 >$

B. $< 3, -6, 7 >$

C. $< 3, 6, 7 >$

D. $< 3, 6, -7, >$

Answer: C

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15. Maximum value of $Z = 3x + y$ for the constraints $x + y \leq 4, x \geq 0, y \geq 0$ is :

A. 12

B. 16

C. 4

D. 10

Answer: A

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16. If $P(A) = \frac{1}{2}, P(B) = \frac{3}{8}$ and $P(A \cap B) = \frac{1}{5}$. then P(A/B) is equal to :

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

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

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

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

Answer: B

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17. Value of sin^-1(1) is

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18. If $A = [a_{ij}]_{2 \times 3}$ such that $a_{ij} = i + j$ then a 11=

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19. If $\begin{vmatrix} x & 0 \\ 7 & 1 \end{vmatrix} = \begin{vmatrix} 3 & 0 \\ 7 & 1 \end{vmatrix}$ then x=

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20. If 'y=cos x ' then at'x=0', 'dy/dx=.....'.

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21. $\int_0^5 dx =$ .....

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22. Order of the differential equation $\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3 + y = 0$ is .....

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23. Direction ratios of a line which is perpendicular to the plane '3x-y+2z=9' are ..... .

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24. Probability of occurrence of impossible event = ...

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25. If A is any square matrix then A + A' is a :

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26. If $y = 10x$ then $\frac{dy}{dx} = 10.$

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27. If $y = \tan x$ then $\frac{dy}{dx} = \sec^2 x$

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28. $\int \frac{dx}{x(x^2+1)}$ equals :

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29. $xdy - ydx = 0$ is a variable separable type of differential equation.

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30. Scalar product of two perpendicular vectors is zero.

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31. Point $(3, -4, 2)$ lies in the plane $2x + y - z = 0$.

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32. If P (E) = 0.4 then P (not E) = 0.6

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Sample Question Paper I Solved Section B

1. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}$ and $f(x) = x^2 + 2x + 3$ then find $f(A)$.

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2. Find the interval in which function $f(x) = x^2 + 2x - 7$ is increasing.

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3. Integrate $\int e^x \left(\log x + \frac{1}{x} \right) dx$.

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4. Using integration find the area bounded by the parabola $y^2 = 4x$ straight lines $x = 1, x = 4$ in the first quadrant.

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5. Find the unit vector in the direction of diagonal of the parallelogram whose sides are given by the vector $\vec{a} = 2\hat{i} - \hat{j} - 3\hat{k}, \vec{b} = 5\hat{i} + 2\hat{j} - \hat{k}$

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6. If $\vec{a} = 2\hat{i} + 3\hat{j} - 5\hat{k}, \vec{b} = 7\hat{i} - 2\hat{j} - 4\hat{k}$ then find $\vec{a} \times \vec{b}$

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Sample Question Paper I Solved Section C

1. Find the value of :

$$2\tan^{-1}(1) - \cos^{-1}\left(\frac{-1}{2}\right) + 3\sin^{-1}\left(\frac{1}{\sqrt{2}}\right) + 2\sec^{-1}\left(\frac{2}{\sqrt{3}}\right)$$

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2. If $y = x^{\sin x} + (\sin x)^x$ then find $\frac{dy}{dx}$.

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3. If $y = \left[\tan^{-1} x\right]^2$, then prove that : $\left(x^2+1\right)^2 y_2 + 2x\left(x^2+1\right)y_1 = 2$.

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4. Evaluate : $\int \frac{dx}{(x-1)(x-2)(x-3)}$.

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5. Evaluate : $\int \frac{\sec^2 x}{\tan^2 x - 4\tan x + 7} dx.$

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6. Find the general solution of the differention equation $x^2 dy - \left(x^2 + xy + y^2\right) dx = 0$

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7. Find the general solution of differential equation : $\sec^2 x \tan y dx + \sec^2 y \tan x dy = 0$

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8. Bag I contains 3 red and 5 white balls and bag 11 contains 4 red and 6 white balls. One of the bags is selected at random and a ball is drawn

from it. The ball is found to be red. Find the probability that ball is drawn from bag 11

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Sample Question Paper I Solved Section D

1. Solve the following system of linear equations by matrix method: $2x + 3y + 4z = 4, x - 2y - z = -2, 3x - y + z = 0$

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2. Express $A = \begin{bmatrix} 2 & 3 & 5 \\ 0 & 2 & 9 \\ 3 & 2 & 8 \end{bmatrix}$ as the sum of a symmetric matrix and a skew-symmetric matrix.

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3. Find the shortest distance between the lines: $\vec{r} = 6\hat{i} + 2\hat{j} + 2\hat{k} + \lambda\left(\hat{i} - 2\hat{j} + 2\hat{k}\right)$ and $\vec{r} = -4\hat{i} - \hat{k} + \mu\left(3\hat{i} - 2\hat{j} -$

.

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4. Find the foot of perpendicular drawn from the point $(2, -3, 5)$ on the plane $3x + 4y - 2z = 20$.

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5. Solve the following linear programming problem graphically :

Maximize and minimize $Z = 4x + 3y$ subject to the constraints

$x + y \leq 8, 4x + y \geq 8, x - y \geq 0, x \geq 0, y \geq 0$

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6. Solve the following linear programming problem graphically :

Maximize and minimize $Z = 5x + 2y - 2$ subject to the constraints

$x + y \leq 10, x + y \geq 3, x \leq 8, y \leq 8, x \geq 0, y \geq 0$

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