



MATHS

BOOKS - DISHA PUBLICATION MATHS (HINGLISH)

PROBABILITY -2

Jee Main 5 Years At A Glance

1. A bag contains 4 red and 6 black balls. A ball is drawn at random from the bag, its colour is observed and this ball along with two additional balls of the same colour are returned to the bag. If now a ball is drawn at random from the bag, then the probability that this drawn ball is

red, is

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

B. $\frac{1}{5}$
C. $\frac{3}{4}$
D. $\frac{3}{10}$

Answer: A



2. Let A,B and C be three events, which are pair-wise independent and \overline{E} denotes the complement of an

event E. If $P(A \cap B \cap C) = 0$ and PC) > 0, then $P[(\overline{A} \cap \overline{B}) \mid C]$ is equal to :

A.
$$P(A) + P(\overline{B})$$

B. $P(\overline{A}) - P(\overline{B})$
C. $P(\overline{A}) - P(B)$
D. $P(\overline{A}) + P(\overline{B})$

Answer: C

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3. If two different numbers are taken from the set $\{0, 1, 2, 3, , 10\}$; then the probability that their sum as

well absolute difference are both multiple of 4, is: $\frac{14}{45}$

(2)
$$\frac{7}{55}$$
 (3) $\frac{6}{55}$ (4) $\frac{12}{55}$

A.
$$\frac{7}{55}$$

B. $\frac{6}{55}$
C. $\frac{12}{55}$
D. $\frac{14}{55}$

Answer: B



4. 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



D. 4

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5. Three persons P, Q and R independentlytry to hit a target. If the probabilities of their hitting the target are $\frac{3}{4}$, $\frac{1}{2}$ and $\frac{5}{8}$ respectively, then the probability that the target is hit by P or Q but not by R is:

A.
$$\frac{21}{64}$$

B. $\frac{9}{64}$
C. $\frac{15}{64}$
D. $\frac{39}{64}$

Answer: A

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6. An unbiased coin is tossed eight times. The probability

of obtaining at least one head and at least one tail is :

A.
$$\frac{255}{256}$$

B. $\frac{127}{122}$

128

C.
$$\frac{63}{64}$$

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



7. Let two fair six-faced dice A and B be thrown simultaneously. If E_1 is the event that die A shows up four, E_2 is the event that die B shows up two and E_3 is the event that the sum of numbers on both dice is odd, then which of the following statements is NOT true ? (1) E_1 and E_2 are independent. (2) E_2 and E_3 are independent. (3) E_1 and E_3 are independent. (4) E_1 , E_2 and E_3 are independent.

A. E_1 and E_3 are independent.

- B. E_1, E_2 and E_3 are independent.
- C. E_1 and E_2 are independent
- D. E_2 and E_3 are independent.

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8. If A and B are any two events such that $P(A) = \frac{2}{5}$ and $P(A \cap B) = \frac{3}{20}$ then the conditional probability $P(A \mid (A' \cup B'))$ where A' denotes the complement of A is equal to

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

B. $\frac{5}{17}$
C. $\frac{8}{17}$
D. $\frac{1}{4}$



9. Let x be set containing 10 elements and p(x) be its power set. If A and B are picked up at random from p(x),with replacement, then probability that A and B have equal number of elements, is

A.
$$\frac{2^{10}-1}{2^{10}}$$

B. $\frac{20C_{10}}{2^{10}}$
C. $\frac{2^{10}-1}{2^{20}}$
D. $\frac{20C_{10}}{2^{20}}$

Answer: D



10. Let A and B be two events such that
$$P(\overline{A \cup B}) = \frac{1}{6}$$
, $P(A \cap B)$ and $P(\overline{A}) = \frac{1}{4}$, where \overline{A} stands for the complement of the event A. Then the 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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11. If X has binomial distribution with mean np and variance npq, then $rac{P(X=r)}{P(X=r-1)}$ is equal to

А. 2-р

В. 3-р

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

D. $\frac{p}{3}$
Answer: B
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Exercise 1 Concept Builder

1. Abhay speaks the truth only 60%. Hasan rolls a dice blindfolded and asks Abhay to tell him if the outcome is a 'prime'. Abhay says, "NO". What is the probability that the outcome is really 'prime'? B. 0.75

C. 0.6

D. None of these

Answer: D

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

A.
$$\frac{11}{14}$$

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

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

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

Answer: A



3. Given two independent events, if the probability that exactly one of them occurs is $\frac{26}{49}$ and the probability that none of them occurs is $\frac{15}{49}$, then the probability of more probable of the two events is :

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

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

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

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

Answer: A



4. 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.

A. 3

B.4

C. 5

D. None of these

Answer: C



5. A bag contains 12 white pearls and 18 black pearls. Two pearls are drawn in succession without replacement. The probability that the first pearl is white and the second is black, is

A.
$$\frac{32}{145}$$

B. $\frac{28}{143}$

C.
$$\frac{36}{145}$$

D. $\frac{36}{143}$

Answer: C



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

A. 1

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

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

D. None of these

Answer: B



7. Two sets of candidates are competing for the position on the board of directors of a company. The probabilities that the first and second sets will win are 0.6 and 0.4 respectively. If the first set wins, the probability of introducing a new product is 0.8 and the corresponding probability if the second set wins is 0.3. What is the probability that the new product will be introduced ? B. 0.7

C. 0.6

D. 0.3

Answer: C



8. In a class 30% students like tea, 20% like coffee and 10% like both tea and coffee. A student is selected at random then what is the probability that he does not like tea if it is known that he likes coffee?

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

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

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

D. None of these

Answer: A



9. Given two bags A and B as follows : Bag A contains 3 red and 2 white balls and bag B contains 2 red and 5 white balls. A bag is selected at random, a ball is drawn and put into the other bag, then a ball is drawn from the second bag. The probability that both balls drawn are of the same colour is

A.
$$\frac{187}{1680}$$

B. $\frac{901}{1680}$
C. $\frac{439}{1680}$

D. None of these

Answer: B

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10. If E_1 and E_2 are two events such that $P(E_1) = 1/4$,

 $P(E_2\,/\,E_1) = 1\,/\,2$ and $P(E_1\,/\,E_2) = 1\,/\,4$, then

A. E_1 and E_3 are independent.

B. E_1 and E_2 are exhaustive

C. E_2 is twice as likely to occur as E_1

D. Probabilities of the events $E_1 \cap E_2, E_1$ and E_2 are

in GP.

Answer: B



11. The probability of the simultaneous occurrence of two events A and B is p. If the probability that exactly one of A, B occurs is q, then which of the following alternatives is incorrect ?

A.
$$P(A^{\,\prime})+P(B^{\,\prime})=2+2q-p$$

B. P(A') + P(B') = 2 - 2p - q

C.
$$P(A \cap B \mid A \cup B) = rac{p}{p+q}$$

D.
$$P(A^{\,\prime} \cap B^{\,\prime}) = 1 - p - q$$

Answer: A

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12. Probability that a man who is 40 year old, living till 75 years is $\frac{5}{16}$, and another man who is 35 years old living till 70 years is $\frac{3}{7}$ then what is the probability that at least one of them will be alive till 35 years hence?

A.
$$\frac{11}{28}$$

B.
$$\frac{19}{28}$$

C. $\frac{17}{28}$

D. None of these

Answer: C



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

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

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

C. $\frac{1}{32}$
D. $\frac{3}{16}$

Answer: A



14. Raj and Sanchita are playing game in which they throw two dice alternately till one of them gets 9. Which one of the following could be the probability that Sanchita win the game?

A.
$$\frac{7}{15}$$
 or $\frac{8}{15}$

B.
$$\frac{6}{11}$$
 or $\frac{5}{11}$
C. $\frac{8}{17}$ or $\frac{9}{17}$

D. None of these

Answer: C



15. One ticket is selected at random from 50 tickets numbered 00, 01, 02, ..., 49. Then the probability that the sum of the digits on the selected ticket is 8, given that the product of these digits is zero, equals (1) 1/14 (2) 1/7(3) 5/14 (4) 1/50

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

B.
$$\frac{5}{14}$$

C. $\frac{1}{50}$
D. $\frac{1}{14}$

Answer: D



16. The chances to fail in Physis are 20% and the chances

to fail in Mathematics are 10%. What are the chances to

fail in atleast one subject ?

A. 0.28

B. 0.38

C. 0.72

D. 0.82

Answer: A



17. 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 B.4:3

C.2:1

 $\mathsf{D}.\,1\!:\!2$

Answer: C



18. A fair coin is tossed repeatedly. If tail appears on first four tosses, them the probability of head appearing that2 white and 1 black balls will be drawn, is

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

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

C.
$$\frac{31}{32}$$

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

Answer: A



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

A.
$$\frac{99}{1000}$$

B. $\frac{97}{1000}$
C. $\frac{93}{1000}$

D. None of these

Answer: A

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

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

B. $\frac{1}{2}$
C. $\frac{2}{3}$
D. $\frac{1}{3}$

Answer: A



21. 19. A is one of 6 horses entered for a race, and is to be ridden by one of two jockeys B and C. It is 2 to 1 that B rides A, in whic case all the horses are equally likely to win; if C rides A, his chance is trebled what are the odds against his winning

A. 5:13

B.5:18

C. 13:5

D. None of these

Answer: C

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

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

B. $\frac{11}{12}$
C. $\frac{24}{25}$
D. $\frac{29}{30}$

Answer: C



23. Pal's gardner is not dependable, the probability that he will forget to water the rose bush is 2/3. The rosebush is in questionable condition. Any how if watered, the probability of its withering is 1/2 & if notwatered then the probability of its withering is 3/4. Pal went out of station & after returning he finds thatrose bush has withered. What is the probability that the gardner did not water the rose bush.

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

B. $\frac{1}{2}$
C. $\frac{1}{3}$
D. $\frac{3}{4}$

Answer: D



24. v33.2

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

B. $\frac{2}{3}$
C. $\frac{3}{7}$
D. $\frac{1}{3}$

Answer: C



25. A and B are two independent witnesses 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 on a certain statement. The probability that the statement is true is
A.
$$\displaystyle \frac{x-y}{x+y}$$

B. $\displaystyle \frac{xy}{1+x+y+xy}$
C. $\displaystyle \frac{x-y}{1-x-y+2xy}$
D. $\displaystyle \frac{xy}{1-x-y+2xy}$

Answer: D



26. 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 ch

A.
$$\frac{1}{29}$$

B. $\frac{28}{29}$
C. $\frac{15}{29}$
D. $\frac{14}{29}$

Answer: D



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

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

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

C. $\frac{3}{5}$
D. $\frac{2}{5}$

Answer: B

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28. For k = 1, 2, 3 the box B_k contains k red balls and (k + 1) white balls. Let $P(B_1) = \frac{1}{2}, P(B_2) = \frac{1}{3}$ and $P(B_3) = \frac{1}{6}$. A box is selected at random and a ball is drawn from it. If a red ball is drawn, then the probability that it has come from box B_2 , is

A.
$$\frac{35}{78}$$

B. $\frac{14}{39}$
C. $\frac{10}{13}$
D. $\frac{12}{13}$

Answer: B



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

A. 0.99

B. 0.871

C. 0.891

D. 0.762

Answer: C

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30. By examining the chest X-ray, probability that T.B is detected when a person is actually suffering is 0.99. the probability that the doctor diagnoses incorrectly that a person has T.B. on the basis of X-ray is 0.001. in a certain city 1 in 100 persons suffers from T.B. A person is selected

at random is diagnosed to have T.B. What is the chance

that he actually has T.B.?

A.
$$\frac{110}{221}$$

B. $\frac{2}{223}$
C. $\frac{110}{223}$
D. $\frac{1}{221}$

Answer: A



31. n letters are written to n different persons and addresses on the n envelopes are also written. If the letters are placed in the envelopes at random, the

probability that at least one letter is not placed in the right envelope, is (A) $1 - \frac{1}{n}$ (B) $1 - \frac{1}{2n}$ (C) $1 - \frac{1}{n^2}$ (D) $1 - \frac{1}{n!}$

A.
$$\frac{1}{1!} - \frac{1}{2!} + \frac{1}{3!} - \frac{1}{4!} + \dots + (-1)^n \frac{1}{n!}$$

B. $\frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \dots + \frac{1}{n!}$
C. $\frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \dots + (-1)^n \frac{1}{n!}$

D. None of these

Answer: C



32. A person write 4 letters and addresses 4 envelopes. If

the letters are placed in the envelopes at random, then

the probability that all letters are not placed in the right envelopes, is a. 1/4 b. 11/24 c. 15/24 d. 23/24

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

B. $\frac{3}{8}$
C. $\frac{5}{8}$

D. 1

Answer: B



33. 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



34. Three letters are written to different persons and

addressess to three envelopes are also written. Without

looking at the addresses, the probability that probability

that the letters go into right envelopes, is

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

B. $\frac{1}{3}$
C. $\frac{1}{6}$
D. $\frac{5}{6}$

Answer: B



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

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

B. $1 - \frac{1}{n!}$
C. $1 - \frac{1}{n}$

D. None of these

Answer: B



36. A fair die is tossed eight times. The probability that a third six is observed in eight throw is $\frac{{}^7C_{10} \times 5^7}{6^7}$ b. $\frac{{}^7C_2 \times 5^2}{6^8}$ c. $\frac{{}^7C_2 \times 5^5}{6^6}$ d. none of these A. $7C^2\frac{5^5}{6^8}$

B.
$$7C^3 \frac{5^3}{6^8}$$

C. $7C^6 \frac{5^6}{6^8}$

D. None of these

Answer: A



37. A die is tossed 5 times. Getting and odd number is cosidered a success. Then, the variance of distribution of success, is

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

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

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

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

Answer: D



38. The probability that a man can hit a target is 3/4. He tries 5 times. The probability that he will hit the target at least three times is

A.
$$\frac{471}{364}$$

B. $\frac{371}{464}$
C. $\frac{471}{582}$

D. $\frac{459}{512}$

Answer: D



39. A random variable X follows binomial distribution with mean α and variance β . Then,

A. I is true, II is true, II is a correct explanation for I

B. I is true, II is true, II is not a correct explanation for

I

C. I is true, II is false

D. I is false, II is true

Answer: B



40. In a hurdle race, a player has to cross 10 hurdles. The probability that he will clear each hurdle is $\frac{5}{6}$. What is the probability that he will knock down fewer than 2 hurdles?

A.
$$rac{5^9}{2 imes 6^9}$$

B. $rac{5^{10}}{2 imes 6^{10}}$
C. $rac{5^9}{2 imes 6^{10}}$
D. $rac{5^{10}}{2 imes 6^9}$



heads are observed more than three times?

A. 64

B. 21

C. 32

D. 42

Answer: D



42. A machine is producing 4% defective products. Find the probability of getting exactly 4 defectives in a sample of 100 is [Given $\log 2 = 0.30102, \log 3 = 0.4771, \log e = 0.4343,$ antilog (.2908) = 1.954] A. 0.192 B. 0.156 C. 0.182 D. 0.1954

Answer: D



43. Given two independent events, if the probability that exactly one of them occurs is $\frac{26}{49}$ and the probability that none of them occurs is $\frac{15}{49}$, then the probability of more probable of the two events is :

A.
$$\frac{5}{32}$$

B. $\frac{27}{32}$
C. $\frac{23}{32}$
D. $\frac{9}{32}$

Answer: B

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44. If the probability density function of a random variable X is $f(x)=rac{x}{2}$ in $0\leq x\leq 2$, then $P(X>1.5\mid X>1)$ is equal to



Answer: C



45. In a binomial distribution, mean is 3 and standard deviation is $\frac{3}{2}$, then the probability function is



Answer: A

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46. A random variable has the following probability

distribution

x:	0	1	2	3	4	5	6	7
p(x)	0	2p	2p	3p	p ²	2p ²	7p ²	2 <i>p</i>

The value of p is

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

B. -1

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

D. None of these

Answer: A

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47. Probability that Priyanka will pass an exam is 'k', she appeared in 5 exams and if probability that she will pass is exactly 4 out of 5 then find the value of 'k'

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

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

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

D. None of these

Answer: A

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48. A fair coin is tossed 99 times. If X is the number of times heads occur, then P(X = r) is maximum when r is 49, 50 b. 50, 51 c. 51, 52 d. none of these

A. 49 or 50

B. 50 or 51

C. 51

D. None of these

Answer: A



49. 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 (1) $\frac{1}{(\log)_{10}^4 - (\log)_{10}^3}$ (2) $\frac{1}{(\log)_{10}^4 + (\log)_{10}^3}$ (3) $\frac{9}{(\log)_{10}^4 - (\log)_{10}^3}$ (4) $\frac{4}{(\log)_{10}^4 - (\log)_{10}^3}$ A. $\frac{1}{\log_{10}4 + \log_{10}3}$

$$\begin{array}{l} \text{B.} \ \displaystyle \frac{9}{\log_{10}4 - \log_{10}3} \\ \text{C.} \ \displaystyle \frac{4}{\log_{10}4 - \log_{10}3} \\ \text{D.} \ \displaystyle \frac{1}{\log_{10}4 - \log_{10}3} \end{array}$$

Answer: D



50. One hundred identical coins, each with probability 'p' of showing heads are tossed once. If 0 and the probability of heads showing on 50 coins is equal to that of heads showing on 51 coins, then the value of p is

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

B.
$$\frac{49}{101}$$

C. $\frac{50}{101}$
D. $\frac{51}{101}$

Answer: D



51. A bag contains three white, two black and four red balls. If four balls are drawn at random with replacement, the probability that the sample contains just one white ball is

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

B.
$$\frac{8}{81}$$

C. $\frac{32}{81}$
D. $\frac{4}{81}$

Answer: C



52. A fair coin is tossed a fixed number of times. If the probability of getting seven heads is equal to that of getting nine heads, the probability of getting two heads, is

A.
$$\frac{15}{2^8}$$

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

C. $\frac{15}{2^{13}}$

D. None of these

Answer: C

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53. A boy is throwing stones at a target. The probability of hitting the target at any trial is $\frac{1}{2}$ The probability of hitting the target 5th time at the 10th throw is

A.
$$\frac{5}{2^{10}}$$

B. $\frac{63}{2^9}$

C.
$$\frac{10C_5}{2^{10}}$$

D. None of these

Answer: B

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54. A pair of fair dice is thrown independently three times. The probability of getting a score of exactly 9 twice is (1) 1/729 (2) 8/9 (3) 8/729 (4) 8/243

A.
$$\frac{8}{729}$$

B. $\frac{8}{243}$
C. $\frac{1}{729}$

Answer: B



55. There is 30 % chance that it rains on any particular day. What is the probability what where is at least one rainy day within a period of 7 days ? Given that there is at least one rainy day, What is the probability that there are at least two rainy days ?

A.
$$\frac{\frac{14}{5} \times \left(\frac{7}{10}\right)^6}{1 + \left(\frac{7}{10}\right)^7}$$
B.
$$\left(\frac{7}{10}\right)^6 - \frac{14}{17}$$

C.
$$\frac{13}{5} \times \left(\frac{7}{10}\right)^{6}$$
D.
$$\frac{1 - \frac{14}{15} \times \left(\frac{7}{10}\right)^{6}}{1 - \left(\frac{7}{10}\right)^{7}}$$

Answer: D



56. Consider the following statements

I : An experiment succeeds twice as often as it fails. Then,

the probability that in the next six trials, there will be

atleast 4 successes is
$$\frac{31}{9} \left(\frac{2}{3}\right)^4$$

II : The number of times must a man toss a fair coin so that the probability of having atleast one head is more than 90% is 4 or mor than 4. A. I is true

B. II is true

C. Both are true

D. Both are false

Answer: C

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57. The mean and variance of a random variable X having a binomial distribution are 4 and 2 respectively. The P(X = 1) is

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

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

C. $\frac{1}{16}$
D. $\frac{1}{8}$

Answer: B



58. The number of events of the binomial distribution for which mean and standard deviation are 10 and $\sqrt{5}$ respectively is

A. 15

B. 12

C. 16

D. 20

Answer: D

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59. If X has binomial distribution with mean np and variance npq, then $rac{P(X=r)}{P(X=r-1)}$ is equal to

A.
$$\frac{n-k}{k-1}\frac{p}{q}$$

B. $\frac{n-k+1}{k}\frac{p}{q}$
C. $\frac{n+1}{k}\frac{q}{p}$
D. $\frac{n-1}{k+1}\frac{q}{p}$

Answer: B



60. In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take X = 0 if he opposed, and X = 1 if he is in favour. Find E(X) and Var (X).

A.
$$\frac{3}{7}$$
, $\frac{5}{17}$
B. $\frac{13}{15}$, $\frac{2}{15}$
C. $\frac{7}{10}$, $\frac{21}{100}$
D. $\frac{7}{10}$, $\frac{23}{100}$

Answer: C

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Exercise 2 Concept Applicator

1. 3 friends A, B and C play the game "Pahle Hum Pahle Tum" in which they throw a die one after the other and the one who will get a composite number 1^{st} will be announced as winner, If A started the game followed by B and then C then what is the ratio of their winning probabilities?

A. 9:6:4

B. 8:6:5

C. 10:5:4

D. None of these

Answer: A

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2. Two events E and F are independent. If P(E)=0.3 and P(

 $E\cup F$)=0.5 then P(E/F)-P(F/E) equals to

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

B. $\frac{3}{35}$
C. $\frac{1}{70}$
Answer: C

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3. The probabilities of four cricketers A, B, C and D scoring more than 50 runs in a match are $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{10}$. It is known that exactly two of the players more than 50 runs in a particular match. The probability that these players were A and B is

A.
$$\frac{27}{65}$$

B. $\frac{5}{6}$
C. $\frac{1}{6}$

D. None of these

Answer: A

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4. consider an event $E=E_1\cap E_2\cap E_3$ find the value of

P(E) if
$$P(E_1) = \frac{2}{5}$$
, $P\left(\frac{E_2}{E_1}\right) = \frac{1}{5}$ and $P\left(\frac{E_3}{E_1E_2}\right) = \frac{1}{10}$
A. $\frac{2}{125}$

B.
$$\frac{1}{125}$$

C. $\frac{3}{125}$

D. None of these

Answer: B



5. A set A has n elements. A subset P of A is selected at random. Returning the elements of P, the set A is formed again and then a subset Q is selected from it. Find the probability that P and Q have no common element.

A. 3667

B. 421

C. 2141

D. 1793



6. Rahul has to write a project, Probability that he will get a project copy is 'p', probability that he will get a blue pen is 'q' and probability that he will get a black pen is 1/2. If he can complete the project either with blue or with black pen or with both and probability that he completed the project is $\frac{1}{2}$ then p(1+q) is

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

B. 1

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

Answer: B



7. Assume that each born child 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?

A.
$$\frac{1}{2}$$
 and $\frac{1}{4}$
B. $\frac{1}{3}$ and $\frac{1}{2}$
C. $\frac{1}{3}$ and $\frac{1}{4}$

D.
$$\frac{1}{2}$$
 and $\frac{1}{3}$

Answer: A

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8. For any two independent events E_1 and E_2 $Pig\{(E_1\cup E_2)\cap ig(\overline{E_1}\cap\overline{E_2}ig\}$ is

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

B. $> \frac{1}{4}$
C. $\ge \frac{1}{2}$

D. None of these

Answer: A



9. Mr. A randomly picks 3 distinct numbers from the set {1, 2, 3, 4, 5, 6, 7, 8, 9} and arranges them in descending order to form a three digit number. Mr. B randomly picks 3 distinct numbers from the set {1, 2, 3, 4, 5, 6, 7, 8} and also arranges them in descending order to form a 3 digit number.

Q. The probability that A and B has the same 3 digit number is :

A. probability that Mr. A's 3 digit number is always greater then Mr. B's 3 digit number is $\frac{1}{3}$ B. probability that Mr. A and Mr. B has the same 3

digit numbers is
$$\frac{1}{84}$$

C. probability that Mr. A's 3 digit number is greater

then Mr. B's 3 digit number is $\frac{37}{56}$

D. probability that Mr. A's 3 digit number is greater

then Mr. B's 3 digit number is $\frac{1}{3}$

Answer: C



10. If $P(B) = \frac{3}{5}$, $P(A/B) = \frac{1}{2}$ and $P(A \cup B) = \frac{4}{5}$, then $P(A \cup B)' + P(A' \cup B)$ is equal to

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

B. $\frac{4}{5}$
C. $\frac{1}{2}$

D. 1

Answer: D



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

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

B. $\frac{1}{2}$
C. $\frac{1}{4}$
D. $\frac{1}{8}$

Answer: C



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

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

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

C. $\frac{1}{4}$
D. $\frac{1}{2}$

Answer: B



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

A.
$$P(A)P(B) = \frac{1}{6}$$

B. A and B are independent

C. A and B are dependent

D. None of these

Answer: C

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14. For two events A and B, if $P(A)P\left(\frac{A}{B}\right) = \frac{1}{4}$ and $P\left(\frac{B}{A}\right) = \frac{1}{2}$, then which of the following is not true ?

A. A and B are mutually exclusive events

B. A and B are dependent events

$$\mathsf{C}.\,P\overline{\left(\frac{A}{B}\right)}=\frac{3}{4}$$

D. None of these

Answer: C



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

A.
$$P(E \mid F) + Pig(\overline{E} \mid Fig) = 1$$

B.
$$P(E \mid F) + Pig(E \mid \overline{F}ig) = 1$$

C.
$$Pig(\overline{E} \mid Fig) + Pig(E \mid \overline{F}ig) = 1$$

D. $Pig(E \mid \overline{F}ig) + Pig(\overline{E} \mid \overline{F}ig) = 0$

Answer: A

16. 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. 0.2

B. 0.7

C. 0.06

D. 0.14

Answer: D



17. If A and B play a series of games in each of which probability that A wins is p and that B wins is q=1-p. Therefore the chance that A wins two games before B wins three is

A.
$$rac{p^2}{1+3q}$$

B. $rac{p^2}{1+3q^2}$
C. $p^2ig(1+2q+3q^2)$

D. None of these

Answer: C

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

A.
$$\frac{24}{29}$$

B. $\frac{1}{4}$
C. $\frac{3}{4}$
D. $\frac{1}{2}$

Answer: A



19. Suppose X is a random variable which takes values 0,1,2,3,... and $P(X = r) = pq^r$, where 0 and r=0,1,2,..... then : $A. <math>P(X \ge a) = q^a$ B. $P(X \ge a + b \mid X \ge a) = P(X \ge b)$ C. $P(X = a + b \mid X \ge a) = P(X = b)$

D. All of the above

Answer: D



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

A. 5

B. 4

C. 6

D. 3

Answer: A



21. A and B are two independent witnesses 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 on a certain statement. The probability that the statement is true is

A.
$$\displaystyle rac{x-y}{x+y}$$

B. $\displaystyle rac{xy}{(1+x+y+xy)}$
C. $\displaystyle rac{x-y}{1-x-y+2xy}$
D. $\displaystyle rac{xy}{1-x-y+2xy}$

Answer: D

22. Girl students constitute 10% of I year and 5% of II year at Roorkee University. During summer holidays 70% of the I year and 30% of II year students are given a project. The chance that I year girl student is on duty in a randomly selected day is

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

B. $\frac{14}{17}$
C. $\frac{3}{10}$
D. $\frac{7}{10}$



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

A.
$$rac{2^5.3^5}{5^{10}}$$

B. $462 imes \left(rac{6}{25}
ight)^5$
C. $231 imes rac{3^5}{5^{10}}$

D. None of these



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

A.
$$\frac{35}{47}$$

B. $\frac{55}{1024}$
C. $\frac{220}{512}$
D. $\frac{11}{204}$



25. Suppose that the probability that an item produced by a particular machine is defective equals 0.2. If 10 items produced from this machine are selected at random, the probability that not more than one defective is found is

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

B. $\frac{2}{e^2}$
C. $\frac{3}{e}$

D. None of these

Answer: C



26. A fair die is thrown 20 times. The probability that on the 10th throw, the fourth six appears is $20C_{10} \times 5^6/6^{20}$ b. $120 \times 5^7/6^{10}$ c. $84 \times 5^6/6^{10}$ d.

A.
$$rac{20C_{10} imes 5^6}{6^{20}}$$

B. $rac{120 imes 5^7}{6^{10}}$
C. $rac{84 imes 5^6}{6^{10}}$

D. None of these

Answer: C



27. A box contains 20 identical balls of which 10 are blue and 10 are green. The balls are drawn at random from the box one at a time with replacement. The probability that a blue ball is drawn 4th time on the 7th draw is

A.
$$\frac{27}{32}$$

B. $\frac{5}{64}$
C. $\frac{5}{32}$
D. $\frac{1}{2}$

Answer: C

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28. In a college, 30% students fail in physics, 25% fail in Mathematics and 10% in both. One student is choosen at random. The probability that she fails in physics, if she has failed in Mathematics is

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

B. $\frac{2}{5}$
C. $\frac{9}{20}$
D. $\frac{1}{3}$



29. A person write 4 letters and addresses 4 envelopes. If the letters are placed in the envelopes at random, then the probability that all letters are not placed in the right envelopes, is a. 1/4 b. 11/24 c. 15/24 d. 23/24

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

B. $\frac{3}{8}$
C. $\frac{5}{8}$

D. 1



30. In a bolt factory, machines A, B and C manufacture 60%, 25% and 15% respectively. Of the total of their outputs 1%, 2%, 1% are defectively from these machines respectively. A bold is drawn at random from the total production and found to be defective. From which machine, the defective bolt is most expected to have been manufactured?

A. Machine A

B. Machine B

C. Machine C

D. None of these





