# EXERCISE-I

## Definition of various terms

**1.** If $P(A_1 \cup A_2) = 1 - P(A_1^c)P(A_2^c)$ where *c* stands for complement, then the events $A_1$ and $A_2$ are

(A) Mutually exclusive

(B) Independent

(C) Equally likely

(D) None of these

**2.** Two fair dice are tossed. Let *A* be the event that the first die shows an even number and *B* be the event that the second die shows an odd number. The two event *A* and *B* are

(A) Mutually exclusive

(B) Independent and mutually exclusive

(C) Dependent

(D) None of these

**3.** A card is drawn from a pack of 52 cards. If *A* = card is of diamond, *B* = card is an ace and $A \cap B =$ card is ace of diamond, then events *A* and *B* are

(A) Independent

(B) Mutually exclusive

(C) Dependent

(D) Equally likely

**4.** If *A* and *B* are two independent events, then *A* and $\bar{B}$ are

(A) Not independent

(B) Also independent

(C) Mutually exclusive

(D) None of these

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

$S_1$ : A and $B \cup C$ are independent

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

Then

(A) Both $S_1$ and $S_2$ are true

(B) Only $S_1$ is true

(C) Only $S_2$ is true

(D) Neither $S_1$ nor $S_2$ is true

## Definition of probability

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

(A) $\frac{1}{36}$ (B) $\frac{3}{36}$

(C) $\frac{5}{36}$ (D) $\frac{1}{6}$

**7.** Two cards are drawn one by one at random from a pack of 52 cards. The probability that both of them are king, is

(A) $\frac{2}{13}$ (B) $\frac{1}{169}$

(C) $\frac{1}{221}$ (D) $\frac{30}{221}$

**8.** A coin is tossed and a dice is rolled. The probability that the coin shows the head and the dice shows 6 is

(A) $\frac{1}{8}$ (B) $\frac{1}{12}$

(C) $\frac{1}{2}$ (D) 1

**9.** A coin is tossed twice. The probability of getting head both the times is

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$

(C) $\frac{3}{4}$ (D) 1

**10.** From a pack of 52 cards two are drawn with replacement. The probability, that the first is a diamond and the second is a king, is

(A) $\frac{1}{26}$ (B) $\frac{17}{2704}$

(C) $\frac{1}{52}$ (D) None of these

**11.** Two dice are thrown simultaneously. The probability of getting the sum 2 or 8 or 12 is

(A) $\frac{5}{18}$ (B) $\frac{7}{36}$

(C) $\frac{7}{18}$ (D) $\frac{5}{36}$

**12.** A dice is thrown twice. The probability of getting 4, 5 or 6 in the first throw and 1, 2, 3 or 4 in the second throw is

(A) 1 (B) $\frac{1}{3}$

(C) $\frac{7}{36}$ (D) None of these

**13.** Two cards are drawn from a pack of 52 cards. What is the probability that at least one of the cards drawn is an ace

(A) $\frac{33}{221}$ (B) $\frac{188}{221}$

(C) $\frac{1}{26}$ (D) $\frac{21}{221}$

**14.** One card is drawn from each of two ordinary packs of 52 cards. The probability that at least one of them is an ace of heart, is

(A) $\frac{103}{2704}$ (B) $\frac{1}{2704}$

(C) $\frac{2}{52}$ (D) $\frac{2601}{2704}$

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

(A) $\frac{3}{16}$ (B) $\frac{5}{16}$

(C) $\frac{11}{16}$ (D) $\frac{14}{16}$

**16.** The probability that an ordinary or a non-leap year has 53 sunday, is

(A) $\frac{2}{7}$ (B) $\frac{1}{7}$

(C) $\frac{3}{7}$ (D) None of these

**17.** A card is drawn at random from a pack of 52 cards. The probability that the drawn card is a court card *i.e.* a jack, a queen or a king, is

(A) $\frac{3}{52}$ (B) $\frac{3}{13}$

(C) $\frac{4}{13}$ (D) None of these

**18.** Two dice are thrown together. The probability that sum of the two numbers will be a multiple of 4 is

(A) $\frac{1}{9}$ (B) $\frac{1}{3}$

(C) $\frac{1}{4}$ (D) $\frac{5}{9}$

**19.** If in a lottary there are 5 prizes and 20 blanks, then the probability of getting a prize is

(A) $\frac{1}{5}$ (B) $\frac{2}{5}$

(C) $\frac{4}{5}$ (D) None of these

**20.** The probability of getting a number greater than 2 in throwing a die is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) $\frac{1}{2}$ (D) $\frac{1}{6}$

**21.** A coin is tossed until a head appears or until the coin has been tossed five times. If a head does not occur on the first two tosses, then the probability that the coin will be tossed 5 times is

(A) $\frac{1}{2}$ (B) $\frac{3}{5}$

(C) $\frac{1}{4}$ (D) $\frac{1}{3}$

**22.** Two dice are tossed. The probability that the total score is a prime number is

(A) $\frac{1}{6}$ (B) $\frac{5}{12}$

(C) $\frac{1}{2}$ (D) None of these

**23.** Three persons work independently on a problem. If the respective probabilities that they will solve it are 1/3, 1/4 and 1/5, then the probability that none can solve it

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$

(C) $\frac{1}{3}$ (D) None of these

**24.** Two dice are thrown. The probability that the sum of the points on two dice will be 7, is

(A) $\frac{5}{36}$ (B) $\frac{6}{36}$

(C) $\frac{7}{36}$ (D) $\frac{8}{36}$

**25.** The probability that an event will fail to happen is 0.05. The probability that the event will take place on 4 consecutive occasions is

(A) 0.00000625 (B) 0.18543125

(C) 0.00001875 (D) 0.81450625

**26.** A determinant is chosen at random from the set of all determinants of order 2 with elements 0 or 1 only. The probability that the determinant chosen is non-zero is

(A) $\frac{3}{16}$ (B) $\frac{3}{8}$

(C) $\frac{1}{4}$ (D) None of these

**27.** The event $A$ is independent of itself if and only if $P(A) =$

(A) 0 (B) 1

(C) 0, 1 (D) None of these

**28.** A locker can be opened by dialing a fixed three digit code (between 000 and 999). A stranger who does not know the code tries to open the locker by dialing three digits at random. The probability that the stranger succeeds at the $k^{th}$ trial is

(A) $\frac{k}{999}$ (B) $\frac{k}{1000}$

(C) $\frac{k-1}{1000}$ (D) None of these

**29.** In a throw of three dice, the probability that at least one die shows up 1, is

(A) $\frac{5}{6}$ (B) $\frac{91}{216}$

(C) $\frac{1}{36}$ (D) $\frac{125}{216}$

**30.** A card is drawn at random from a well shuffled pack of 52 cards. The probability of getting a two of heart or diamond is

(A) $\frac{1}{26}$ (B) $\frac{1}{52}$

(C) $\frac{1}{13}$ (D) None of these

**31.** A man and his wife appear for an interview for two posts. The probability of the husband's selection is $\frac{1}{7}$ and that of the wife's selection is $\frac{1}{5}$. What is the probability that only one of them will be selected

(A) $\frac{1}{7}$ (B) $\frac{2}{7}$

(C) $\frac{3}{7}$ (D) None of these

**32.** A bag contains 5 white, 7 red and 8 black balls. If four balls are drawn one by one without replacement, what is the probability that all are white

(A) $\frac{1}{969}$ (B) $\frac{1}{380}$

(C) $\frac{5}{20}$ (D) None of these

**33.** The probability of *A, B, C* solving a problem are $\frac{1}{3}, \frac{2}{7}, \frac{3}{8}$ respectively. If all the three try to solve the problem simultaneously, the probability that exactly one of them will solve it, is

(A) $\frac{25}{168}$ (B) $\frac{25}{56}$

(C) $\frac{20}{168}$ (D) $\frac{30}{168}$

**34.** In a single throw of two dice, the probability of obtaining a total of 7 or 9, is

(A) $\frac{5}{18}$ (B) $\frac{1}{6}$

(C) $\frac{1}{9}$ (D) None of these

**35.** A bag contains 19 tickets numbered from 1 to 19. A ticket is drawn and then another ticket is drawn without replacement. The probability that both the tickets will show even number, is

(A) $\frac{9}{19}$ (B) $\frac{8}{18}$

(C) $\frac{9}{18}$ (D) $\frac{4}{19}$

**36.** If $P(A) = 0.65,\ P(B) = 0.15,$ then $P(\bar{A}) + P(\bar{B}) =$

(A) 1.5 (B) 1.2

(C) 0.8 (D) None of these

**37.** For any two independent events $E_1$ and $E_2$, $P\{(E_1 \cup E_2) \cap (\bar{E}_1 \cap \bar{E}_2)\}$ is

(A) $< \frac{1}{4}$ (B) $> \frac{1}{4}$

(C) $\geq \frac{1}{2}$ (D) None of these

**38.** For independent events $A_1, A_2, ....., A_n$, $P(A_i) = \frac{1}{i+1}$, i = 1, 2,....., n. Then the probability that none of the event will occur, is

(A) $\frac{n}{n+1}$ (B) $\frac{n-1}{n+1}$

(C) $\frac{1}{n+1}$ (D) None of these

**39.** In order to get at least once a head with probability $\geq 0.9$, the number of times a coin needs to be tossed is

(A) 3 (B) 4

(C) 5 (D) None of these

**40.** A bag contains 3 black and 4 white balls. Two balls are drawn one by one at random without replacement. The probability that the second drawn ball is white, is

(A) $\frac{4}{49}$ (B) $\frac{1}{7}$

(C) $\frac{4}{7}$ (D) $\frac{12}{49}$

**41.** A fair coin is tossed repeatedly. If tail appears on first four tosses then the probability of head appearing on fifth toss equals

(A) $\frac{1}{2}$ (B) $\frac{1}{32}$

(C) $\frac{31}{32}$ (D) $\frac{1}{5}$

**42.** A coin is tossed 3 times by 2 persons. What is the probability that both get equal number of heads

(A) $\frac{3}{8}$ (B) $\frac{1}{9}$

(C) $\frac{5}{16}$ (D) None of these

**43.** The sum of two positive numbers is 100. The probability that their product is greater than 1000 is

(A) $\frac{7}{9}$ (B) $\frac{7}{10}$

(C) $\frac{2}{5}$ (D) None of these

**44.** The corners of regular tetrahedrons are numbered 1, 2, 3, 4. Three tetrahedrons are tossed. The probability that the sum of upward corners will be 5 is

(A) $\frac{5}{24}$ (B) $\frac{5}{64}$

(C) $\frac{3}{32}$ (D) $\frac{3}{16}$

**45.** An integer is chosen at random and squared. The probability that the last digit of the square is 1 or 5 is

(A) $\frac{2}{10}$ (B) $\frac{3}{10}$

(C) $\frac{4}{10}$ (D) $\frac{9}{25}$

**46.** Two cards are drawn without replacement from a well-shuffled pack. Find the probability that one of them is an ace of heart

(A) $\frac{1}{25}$ (B) $\frac{1}{26}$

(C) $\frac{1}{52}$ (D) None of these

**47.** A problem in Mathematics is given to three students *A, B*, *C* and their respective probability of solving the problem is 1/2, 1/3 and 1/4. Probability that the problem is solved is

(A) $\frac{3}{4}$ (B) $\frac{1}{2}$

(C) $\frac{2}{3}$ (D) $\frac{1}{3}$

**48.** The chance of getting a doublet with 2 dice is

(A) $\frac{2}{3}$ (B) $\frac{1}{6}$

(C) $\frac{5}{6}$ (D) $\frac{5}{36}$

**49.** The chance of throwing a total of 7 or 12 with 2 dice, is

(A) $\frac{2}{9}$ (B) $\frac{5}{9}$

(C) $\frac{5}{36}$ (D) $\frac{7}{36}$

**50.** There are 10 pairs of shoes in a cupboard from which 4 shoes are picked at random. The probability that there is at least one pair, is

(A) $\frac{99}{323}$ (B) $\frac{224}{323}$

(C) $\frac{100}{323}$ (D) None of these

**51.** A bag contains 3 red and 7 black balls, two balls are taken out at random, without replacement. If the first ball taken out is red, then what is the probability that the second taken out ball is also red

(A) $\frac{1}{10}$ (B) $\frac{1}{15}$

(C) $\frac{3}{10}$ (D) $\frac{2}{21}$

**52.** The probability that a leap year selected randomly will have 53 Sundays is

(A) $\frac{1}{7}$ (B) $\frac{2}{7}$

(C) $\frac{4}{53}$ (D) $\frac{4}{49}$

**53.** A bag contains 3 white and 2 black balls and another bag contains 2 white and 4 black balls. A ball is picked up randomly. The probability of its being black is

(A) $\frac{2}{5}$ (B) $\frac{8}{15}$

(C) $\frac{6}{11}$ (D) $\frac{2}{3}$

**54.** A bag $x$ contains 3 white balls and 2 black balls and another bag $y$ contains 2 white balls and 4 black balls. A bag and a ball out of it are picked at random. The probability that the ball is white, is

(A) 3/5 (B) 7/15

(C) 1/2 (D) None of these

**55.** A box containing 4 white pens and 2 black pens. Another box containing 3 white pens and 5 black pens. If one pen is selected from each box, then the probability that both the pens are white is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

(C) $\frac{1}{4}$ (D) $\frac{1}{5}$

## Use of permutations and combinations in probability

**56.** The letter of the word `ASSASSIN' are written down at random in a row. The probability that no two $S$ occur together is

(A) $\frac{1}{35}$ (B) $\frac{1}{14}$

(C) $\frac{1}{15}$ (D) None of these

**57.** The probability of getting 4 heads in 8 throws of a coin, is

(A) $\frac{1}{2}$ (B) $\frac{1}{64}$

(C) $\frac{{}^8C_4}{8}$ (D) $\frac{{}^8C_4}{2^8}$

**58.** In a lottery 50 tickets are sold in which 14 are of prize. A man bought 2 tickets, then the probability that the man win the prize, is

(A) $\frac{17}{35}$ (B) $\frac{18}{35}$

(C) $\frac{72}{175}$ (D) $\frac{13}{175}$

**59.** A bag contains 8 black and 7 white balls. Two balls are drawn at random. Then for which the probability is more

(A) Both balls are white

(B) One ball is white and one is black

(C) Both balls are black

(D) All of the above are equals

**60.** A committee has to be made of 5 members from 6 men and 4 women. The probability that at least one woman is present in committee, is

(A) $\frac{1}{42}$ (B) $\frac{41}{42}$

(C) $\frac{2}{63}$ (D) $\frac{1}{7}$

**61.** A three digit number is formed by using numbers 1, 2, 3 and 4. The probability that the number is divisible by 3, is

(A) $\frac{2}{3}$ (B) $\frac{2}{7}$

(C) $\frac{1}{2}$ (D) $\frac{3}{4}$

**62.** From a pack of playing cards three cards are drawn simultaneously. The probability that these are one king, one queen and one jack is

(A) $\frac{64}{5525}$ (B) $\frac{16}{5525}$

(C) $\frac{128}{5525}$ (D) $\frac{64}{625}$

**63.** Word 'UNIVERSITY' is arranged randomly. Then the probability that both 'I' does not come together, is

(A) $\frac{3}{5}$ (B) $\frac{2}{5}$

(C) $\frac{4}{5}$ (D) $\frac{1}{5}$

**64.** There are $n$ different objects 1, 2, 3,.....$n$ distributed at random in $n$ places marked 1, 2, 3, .....$n$. The probability that at least three of the objects occupy places corresponding to their number is

(A) $\frac{1}{6}$ (B) $\frac{5}{6}$

(C) $\frac{1}{3}$ (D) None of these

**65.** An ordinary cube has four blank faces, one face marked 2 another marked 3. Then the probability of obtaining a total of exactly 12 in 5 throws, is

(A) $\frac{5}{1296}$ (B) $\frac{5}{1944}$

(C) $\frac{5}{2592}$ (D) None of these

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

(A) $\frac{9}{87}$ (B) $\frac{12}{87}$

(C) $\frac{15}{87}$ (D) $\frac{47}{87}$

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

(A) 4 (B) 5

(C) 6 (D) 3

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

(A) $\frac{1}{45}$ (B) $\frac{1}{90}$

(C) $\frac{1}{100}$ (D) None of these

**69.** In a box there are 2 red, 3 black and 4 white balls. Out of these three balls are drawn together. The probability of these being of same colour is

(A) $\frac{1}{84}$ (B) $\frac{1}{21}$

(C) $\frac{5}{84}$ (D) None of these

**70.** Six boys and six girls sit in a row randomly. The probability that the six girls sit together

(A) $\frac{1}{77}$ (B) $\frac{1}{132}$

(C) $\frac{1}{231}$ (D) None of these

**71.** From a group of 7 men and 4 ladies a committee of 6 persons is formed, then the probability that the committee contains 2 ladies is

(A) $\frac{5}{13}$ (B) $\frac{5}{11}$

(C) $\frac{4}{11}$ (D) $\frac{3}{11}$

**72.** A bag contains 4 white and 3 red balls. Two draws of one ball each are made without replacement. Then the probability that both the balls are red is

(A) $\frac{1}{7}$ (B) $\frac{2}{7}$

(C) $\frac{3}{7}$ (D) $\frac{4}{7}$

**73.** A bag contains 5 white, 7 black and 4 red balls. Three balls are drawn from the bag at random. The probability that all the three balls are white, is

(A) $\frac{3}{16}$ (B) $\frac{3}{5}$

(C) $\frac{1}{60}$ (D) $\frac{1}{56}$

**74.** Out of 40 consecutive natural numbers, two are chosen at random. Probability that the sum of the numbers is odd, is

(A) $\frac{14}{29}$ (B) $\frac{20}{39}$

(C) $\frac{1}{2}$ (D) None of these

**75.** The probability that the three cards drawn from a pack of 52 cards are all red is

(A) $\frac{1}{17}$ (B) $\frac{3}{19}$

(C) $\frac{2}{19}$ (D) $\frac{2}{17}$

**76.** A bag contains 4 white, 5 red and 6 green balls. Three balls are picked up randomly. The probability that a white, a red and a green ball is drawn is

(A) $\frac{15}{91}$ (B) $\frac{30}{91}$

(C) $\frac{20}{91}$ (D) $\frac{24}{91}$

**77.** A box contains 10 red balls and 15 green balls. If two balls are drawn in succession then the probability that one is red and other is green, is

(A) $\frac{1}{3}$ (B) $\frac{1}{2}$

(C) $\frac{1}{4}$ (D) None of these

**78.** Three cards are drawn at random from a pack of 52 cards. What is the chance of drawing three aces

(A) $\frac{3}{5525}$ (B) $\frac{2}{5525}$

(C) $\frac{1}{5525}$ (D) None of these

**79.** A pack of cards contains 4 aces, 4 kings, 4 queens and 4 jacks. Two cards are drawn at random. The probability that at least one of these is an ace, is

(A) $\frac{9}{20}$ (B) $\frac{3}{16}$

(C) $\frac{1}{6}$ (D) $\frac{1}{9}$

**80.** A fair coin is tossed 100 times. The probability of getting tails an odd number of times is

(A) $\frac{1}{2}$ (B) $\frac{1}{8}$

(C) $\frac{3}{8}$ (D) None of these

## Odds in favour and odds against, Addition theorem on probability

**81.** If two events $A$ and $B$ are such that $P(A+B)=\frac{5}{6}$, $P(AB)=\frac{1}{3}$ and $P(\bar{A})=\frac{1}{2}$, then the events $A$ and $B$ are

(A) Independent
(B) Mutually exclusive
(C) Mutually exclusive and independent
(D) None of these

**82.** The probabilities of three mutually exclusive events are 2/3, 1/4 and 1/6. The statement is

(A) True (B) Wrong

(C) Could be either (D) Do not know

**83.** If $A$ and $B$ are two events such that $P(A) = 0.4$, $P(A + B) = 0.7$ and $P(AB) = 0.2$, then $P(B) =$

(A) 0.1 (B) 0.3

(C) 0.5 (D) None of these

**84.** Suppose that $A, B, C$ are events such that $P(A) = P(B) = P(C) = \frac{1}{4}, P(AB) = P(CB) = 0, P(AC) = \frac{1}{8}$, then $P(A + B) =$

(A) 0.125 (B) 0.25

(C) 0.375 (D) 0.5

**85.** A card is drawn at random from a pack of cards. The probability of this card being a red or a queen is

(A) $\frac{1}{13}$ (B) $\frac{1}{26}$

(C) $\frac{1}{2}$ (D) $\frac{7}{13}$

**86.** If the probability of $X$ to fail in the examination is 0.3 and that for $Y$ is 0.2, then the probability that either $X$ or $Y$ fail in the examination is

(A) 0.5 (B) 0.44

(C) 0.6 (D) None of these

**87.** If $P(A) = 0.4, P(B) = x, P(A \cup B) = 0.7$ and the events $A$ and $B$ are independent, then $x$ =

(A) $\frac{1}{3}$ (B) $\frac{1}{2}$

(C) $\frac{2}{3}$ (D) None of these

**88.** If $A$ and $B$ are two events of a random experiment, $P(A) = 0.25$, $P(B) = 0.5$ and $P(A \cap B) = 0.15$, then $P(A \cap \bar{B}) =$

(A) 0.1 (B) 0.35

(C) 0.15 (D) 0.6

**89.** If $P(A) = 0.4, P(B) = x, P(A \cup B) = 0.7$ and the events A and B are mutually exclusive, then $x =$

(A) $\frac{3}{10}$ (B) $\frac{1}{2}$

(C) $\frac{2}{5}$ (D) $\frac{1}{5}$

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

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

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

(C) $P(A) + P(B) - P(A \cup B)$

(D) $P(A) + P(B) - 2P(A \cup B)$

**91.** If $A$ and $B$ are two events such that $P(A \cup B) + P(A \cap B) = \frac{7}{8}$ and $P(A) = 2P(B)$, then $P(A) =$

(A) $\frac{7}{12}$ (B) $\frac{7}{24}$

(C) $\frac{5}{12}$ (D) $\frac{17}{24}$

**92.** The probabilities that $A$ and $B$ will die within a year are $p$ and $q$ respectively, then the probability that only one of them will be alive at the end of the year is

(A) $p + q$ (B) $p + q - 2qp$

(C) $p + q - pq$ (D) $p + q + pq$

**93.** $A$ and $B$ are two independent events. The probability that both $A$ and $B$ occur is $\frac{1}{6}$ and the probability that neither of them occurs is $\frac{1}{3}$. Then the probability of the two events are respectively

(A) $\frac{1}{2}$ and $\frac{1}{3}$ (B) $\frac{1}{5}$ and $\frac{1}{6}$

(C) $\frac{1}{2}$ and $\frac{1}{6}$ (D) $\frac{2}{3}$ and $\frac{1}{4}$

**94.** If $A$ and $B$ are two independent events such that $P(A \cap B') = \frac{3}{25}$ and $P(A' \cap B) = \frac{8}{25}$, then $P(A) =$

(A) $\frac{1}{5}$ (B) $\frac{3}{8}$

(C) $\frac{2}{5}$ (D) $\frac{4}{5}$

**95.** Let $A$ and $B$ be two events such that $P(A) = 0.3$ and $P(A \cup B) = 0.8$. If $A$ and $B$ are independent events, then $P(B) =$

(A) $\frac{5}{6}$ (B) $\frac{5}{7}$

(C) $\frac{3}{5}$ (D) $\frac{2}{5}$

**96.** For two given events $A$ and $B$, $P(A \cap B) =$

(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) All of the above

**97.** $P(A \cup B) = P(A \cap B)$ if and only if the relation between $P(A)$ and $P(B)$ is

(A) $P(A) = P(\bar{A})$

(B) $P(A \cap B) = P(A' \cap B')$

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

(D) None of these

**98.** The two events $A$ and $B$ have probabilities 0.25 and 0.50 respectively. The probability that both $A$ and $B$ occur simultaneously is 0.14. Then the probability that neither $A$ nor $B$ occurs is

(A) 0.39 (B) 0.25

(C) 0.904 (D) None of these

**99.** Twelve tickets are numbered 1 to 12. One ticket is drawn at random, then the probability of the number to be divisible by 2 or 3, is

(A) $\frac{2}{3}$ (B) $\frac{7}{12}$

(C) $\frac{5}{6}$ (D) $\frac{3}{4}$

**100.** Three athlete $A$, $B$ and $C$ participate in a race competetion. The probability of winning $A$ and $B$ is twice of winning $C$. Then the probability that the race win by $A$ or $B$, is

(A) $\frac{2}{3}$ (B) $\frac{1}{2}$

(C) $\frac{4}{5}$ (D) $\frac{1}{3}$

**101.** One card is drawn from a pack of 52 cards. The probability that it is a queen or heart is

(A) $\frac{1}{26}$ (B) $\frac{3}{26}$

(C) $\frac{4}{13}$ (D) $\frac{3}{13}$

**102.** The probabilities of occurrence of two events are respectively 0.21 and 0.49. The probability that both occurs simultaneously is 0.16. Then the probability that none of the two occurs is

(A) 0.30 (B) 0.46

(C) 0.14 (D) None of these

**103.** Let $A$ and $B$ be events for which $P(A) = x$, $P(B) = y, P(A \cap B) = z$, then $P(\bar{A} \cap B)$ equals

(A) $(1-x)y$ (B) $1-x+y$

(C) $y-z$ (D) $1-x+y-z$

**104.** The probability of solving a question by three students are $\frac{1}{2}, \frac{1}{4}, \frac{1}{6}$ respectively. Probability of question is being solved will be

(A) $\frac{33}{48}$ (B) $\frac{35}{48}$

(C) $\frac{31}{48}$ (D) $\frac{37}{48}$

**105.** Let $A$ and $B$ are two independent events. The probability that both $A$ and $B$ occur together is 1/6 and the probability that neither of them occurs is 1/3. The probability of occurrence of $A$ is

(A) 0 or 1 (B) $\frac{1}{2}$ or $\frac{1}{3}$

(C) $\frac{1}{2}$ or $\frac{1}{4}$ (D) $\frac{1}{3}$ or $\frac{1}{4}$

## Conditional probability, Baye's theorem

**106.** If $4P(A) = 6P(B) = 10P(A \cap B) = 1$, then $P\left(\frac{B}{A}\right) =$

(A) $\frac{2}{5}$ (B) $\frac{3}{5}$

(C) $\frac{7}{10}$ (D) $\frac{19}{60}$

**107.** For a biased die, the probabilities for different faces to turn up are

| Face : | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Probab-ility : | 0.2 | 0.22 | 0.11 | 0.25 | 0.05 | 0.17 |

The die is tossed and you are told that either face 4 or face 5 has turned up. The probability that it is face 4 is

(A) $\frac{1}{6}$ (B) $\frac{1}{4}$

(C) $\frac{5}{6}$ (D) None of these

**108.** A pair has two children. If one of them is boy, then the probability that other is also a boy, is

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$

(C) $\frac{1}{3}$ (D) None of these

**109.** Three coins are tossed. If one of them shows tail, then the probability that all three coins show tail, is

(A) $\frac{1}{7}$ (B) $\frac{1}{8}$

(C) $\frac{2}{7}$ (D) $\frac{1}{6}$

**110.** If $A$ and $B$ are two independent events such that $P(A) = \frac{1}{2}, P(B) = \frac{1}{5}$, then

(A) $P\left(\frac{A}{B}\right) = \frac{1}{2}$ (B) $P\left(\frac{A}{A \cup B}\right) = \frac{5}{6}$

(C) $P\left(\frac{A \cap B}{A' \cup B'}\right) = 0$ (D) All of the above

**111.** For a biased die the probabilities for different faces to turn up are given below

| Face : | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Proba bility : | 0.1 | 0.32 | 0.21 | 0.15 | 0.05 | 0.17 |

The die is tossed and you are told that either face 1 or 2 has turned up. Then the probability that it is face 1, is

(A) $\frac{5}{21}$ (B) $\frac{5}{22}$

(C) $\frac{4}{21}$ (D) None of these

**112.** In a certain town, 40% of the people have brown hair, 25% have brown eyes and 15% have both brown hair and brown eyes. If a person selected at random from the town, has brown hair, the probability that he also has brown eyes, is

(A) $\frac{1}{5}$ (B) $\frac{3}{8}$

(C) $\frac{1}{3}$ (D) $\frac{2}{3}$

**113.** There are 3 bags which are known to contain 2 white and 3 black balls; 4 white and 1 black balls and 3 white and 7 black balls respectively. A ball is drawn at random from one of the bags and found to be a black ball. Then the probability that it was drawn from the bag containing the most black balls is

(A) $\frac{7}{15}$ (B) $\frac{5}{19}$

(C) $\frac{3}{4}$ (D) None of these

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

(A) $\frac{37}{40}$ (B) $\frac{1}{37}$

(C) $\frac{36}{37}$ (D) $\frac{1}{9}$

**115.** 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 $P\left(\frac{E}{F}\right) =$

(A) $\frac{3}{4}$ (B) $\frac{3}{8}$

(C) $\frac{1}{2}$ (D) $\frac{1}{8}$

**116.** One ticket is selected at random from 100 tickets numbered 00, 01, 02, ..... 98, 99. If $X$ and $Y$ denote the sum and the product of the digits on the tickets, then $P(X = 9 / Y = 0)$ equals

(A) $\frac{1}{19}$ (B) $\frac{2}{19}$

(C) $\frac{3}{19}$ (D) None of these

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

(A) $\frac{3}{8}$ (B) $\frac{1}{5}$

(C) $\frac{3}{4}$ (D) None of these

**118.** A bag '$A$' contains 2 white and 3 red balls and bag '$B$' contains 4 white and 5 red balls. One ball is drawn at random from a randomly chosen bag and is found to be red. The probability that it was drawn from bag '$B$' was

(A) $\frac{5}{14}$ (B) $\frac{5}{16}$

(C) $\frac{5}{18}$ (D) $\frac{25}{52}$

**119.** A bag $X$ contains 2 white and 3 black balls and another bag $Y$ contains 4 white and 2 black balls. One bag is selected at random and a ball is drawn from it. Then the probability for the ball chosen be white is

(A) $\frac{2}{15}$ (B) $\frac{7}{15}$

(C) $\frac{8}{15}$ (D) $\frac{14}{15}$

**120.** Bag $A$ contains 4 green and 3 red balls and bag $B$ contains 4 red and 3 green balls. One bag is taken at random and a ball is drawn and noted it is green. The probability that it comes bag $B$

(A) $\frac{2}{7}$ (B) $\frac{2}{3}$

(C) $\frac{3}{7}$ (D) $\frac{1}{3}$

## Binomial distribution

**121.** The binomial distribution for which mean = 6 and variance = 2, is

(A) $\left(\frac{2}{3}+\frac{1}{3}\right)^6$ (B) $\left(\frac{2}{3}+\frac{1}{3}\right)^9$

(C) $\left(\frac{1}{3}+\frac{2}{3}\right)^6$ (D) $\left(\frac{1}{3}+\frac{2}{3}\right)^9$

**122.** A dice is thrown ten times. If getting even number is considered as a success, then the probability of four successes is

(A) ${}^{10}C_4\left(\frac{1}{2}\right)^4$ (B) ${}^{10}C_4\left(\frac{1}{2}\right)^6$

(C) ${}^{10}C_4\left(\frac{1}{2}\right)^8$ (D) ${}^{10}C_6\left(\frac{1}{2}\right)^{10}$

**123.** If the mean and variance of a binomial variate $X$ are 2 and 1 respectively, then the probability that $X$ takes a value greater than 1, is

(A) $\frac{2}{3}$ (B) $\frac{4}{5}$

(C) $\frac{7}{8}$ (D) $\frac{15}{16}$

**124.** At least number of times a fair coin must be tossed so that the probability of getting at least one head is at least 0.8, is

(A) 7 (B) 6

(C) 5 (D) None of these

**125.** A biased coin with probability $p, 0 < p < 1,$ of heads is tossed until a head appears for the first time. If the probability that the number of tosses required is even is $\frac{2}{5}$, then $p =$

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$

(C) $\frac{1}{4}$ (D) None of these

**126.** The probability of a bomb hitting a bridge is $\frac{1}{2}$ and two direct hits are needed to destroy it. The least number of bombs required so that the probability of the bridge beeing destroyed is greater then 0.9, is

(A) 8 (B) 7

(C) 6 (D) 9

**127.** If $X$ follows a binomial distribution with parameters $n = 6$ and $p$. If $9P(X = 4) = P(X = 2),$ then $p =$

(A) $\frac{1}{3}$ (B) $\frac{1}{2}$

(C) $\frac{1}{4}$ (D) 1

**128.** A die is tossed thrice. If getting a four is considered a success, then the mean and variance of the probability distribution of the number of successes are

(A) $\frac{1}{2},\frac{1}{12}$ (B) $\frac{1}{6},\frac{5}{12}$

(C) $\frac{5}{6},\frac{1}{2}$ (D) None of these

**129.** A die is tossed twice. Getting a number greater than 4 is considered a success. Then the variance of the probability distribution of the number of successes is

(A) $\frac{2}{9}$ (B) $\frac{4}{9}$

(C) $\frac{1}{3}$ (D) None of these

**130.** A die is thrown three times. Getting a 3 or a 6 is considered success. Then the probability of at least two successes is

(A) $\frac{2}{9}$ (B) $\frac{7}{27}$

(C) $\frac{1}{27}$ (D) None of these

**131.** Assuming that for a husband-wife couple the chances of their child being a boy or a girl are the same, the probability of their two children being a boy and a girl is

(A) $\frac{1}{4}$ (B) 1

(C) $\frac{1}{2}$ (D) $\frac{1}{8}$

**132.** The probability that a student is not a swimmer is 1/5. What is the probability that out of 5 students, 4 are swimmers

(A) ${}^5C_4\left(\frac{4}{5}\right)^4\frac{1}{5}$ (B) $\left(\frac{4}{5}\right)^4\frac{1}{5}$

(C) ${}^5C_1\frac{1}{5}\left(\frac{4}{5}\right)^4 \times {}^5C_4$ (D) None of these

**133.** An experiment succeeds twice as often as it fails. Find the probability that in 4 trials there will be at least three success

(A) $\frac{4}{27}$ (B) $\frac{8}{27}$

(C) $\frac{16}{27}$ (D) $\frac{24}{27}$

**134.** The mean and variance of a binomial distribution are 6 and 4. The parameter $n$ is

(A) 18 (B) 12

(C) 10 (D) 9

**135.** Five coins whose faces are marked 2, 3 are tossed. The chance of obtaining a total of 12 is

(A) $\frac{1}{32}$ (B) $\frac{1}{16}$

(C) $\frac{3}{16}$ (D) $\frac{5}{16}$

**136.** In a binomial distribution the probability of getting a success is 1/4 and standard deviation is 3, then its mean is

(A) 6 (B) 8

(C) 12 (D) 10

**137.** A coin is tossed 10 times. The probability of getting exactly six heads is

(A) $\frac{512}{513}$ (B) $\frac{105}{512}$

(C) $\frac{100}{153}$ (D) ${}^{10}C_6$

**138.** If a dice is thrown twice, the probability of occurrence of 4 at least once is

(A) $\frac{11}{36}$ (B) $\frac{7}{12}$

(C) $\frac{35}{36}$ (D) None of these

**139.** The mean and variance of a random variable $X$ having a binomial distribution are 4 and 2 respectively, then $P(X = 1)$ is

(A) 1/32 (B) 1/16

(C) 1/8 (D) 1/4

**140.** A coin is tossed $n$ times. The probability of getting head at least once is greater than 0.8, then the least value of $n$ is

(A) 2 (B) 3

(C) 4 (D) 5