

PROBABILITY (ASSIGNMENT)

- Twenty children are standing in a line outside a ticket window at Appu Ghar in New Delhi. Ten of these children have a one-rupee coin each and the remaining 10 have a two-rupee coin each. The entry ticket is priced Re. 1. If all the arrangements of the 20 children are equally likely, the probability that the 10th will be the first to wait for change is (Assume that the cashier has no change to begin with)

(a) $\frac{2^{10}}{20 C_{10}}$ (b) $\frac{20 C_{10}}{2^{10}}$ (c) 0 (d) None of these
- 4 five-rupee coins, 3 two-rupee coins and 2 one-rupee coins are stacked together in a column at random. The probability that the coins of the same denomination are consecutive is

(a) $\frac{13}{9!}$ (b) $\frac{1}{210}$ (c) $\frac{1}{35}$ (d) None of these
- Two small squares on a chess board are chosen at random. Probability that they have a common side is

(a) 1/3 (b) 1/9 (c) 1/18 (d) None of these
- There are n persons ($n \geq 3$), among whom are A and B , who are made to stand in a row in random order. Probability that there is exactly one person between A and B is

(a) $\frac{n-2}{n(n-1)}$ (b) $\frac{2(n-2)}{n(n-1)}$ (c) $2/n$ (d) None of these
- If m rupee coins and n ten paise coins are placed in a line, then the probability that the extreme coins are ten paise coins is

(a) ${}^{m+n}C_m$ (b) $\frac{n(n-1)}{(m+n)(m+n-1)}$ (c) ${}^{m+n}P_m$ (d) ${}^{m+n}P_n$
- Twelve balls are distributed among three boxes. The probability that the first box contains 3 balls is

(a) $\frac{110}{9} \left(\frac{2}{3}\right)^{10}$ (b) $\frac{9}{110} \left(\frac{2}{3}\right)^{10}$ (c) $\frac{{}^{12}C_3}{12^3} \cdot 2^9$ (d) $\frac{{}^{12}C_3}{3^{12}}$
- Six boys and six girls sit in a row. What is the probability that the boys and girls sit alternately

(a) 1/462 (b) 1/924 (c) 1/2 (d) None of these
- 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) $\frac{1}{5}$
- A fair coin is tossed repeatedly. If tail appears on first four tosses, then the probability of head appearing on fifth toss equals

(a) 1/2 (b) 1/32 (c) 31/32 (d) 1/5
- A determinant is chosen at random. The set of all determinants of order 2 with elements 0 or 1 only. The probability that value of the determinant chosen is positive, is

(a) $\frac{3}{16}$ (b) $\frac{3}{8}$ (c) $\frac{1}{4}$ (d) None of these
- Out of 13 applicants for a job, there are 5 women and 8 men. It is desired to select 2 persons for the job. The probability that at least one of the selected persons will be a woman is

(a) 25/39 (b) 14/39 (c) 5/13 (d) 10/13
- Two numbers are selected at random from 1, 2, 3.....100 and are multiplied, then the probability correct to two places of decimals that the product thus obtained is divisible by 3, is

(a) 0.55 (b) 0.44 (c) 0.22 (d) 0.33
- Five digit numbers are formed using the digits 1, 2, 3, 4, 5, 6, and 8. What is the probability that they have even digits at both the ends

(a) 2/7 (b) 3/7 (c) 4/7 (d) None of these
- 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

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- (a) $\frac{5}{24}$ (b) $\frac{5}{64}$ (c) $\frac{3}{32}$ (d) $\frac{3}{16}$
15. If four vertices of a regular octagon are chosen at random, then the probability that the quadrilateral formed by them is a rectangle is
- (a) $\frac{1}{8}$ (b) $\frac{2}{21}$ (c) $\frac{1}{32}$ (d) $\frac{1}{35}$
16. In a college, 25% of the boys and 10% of the girls offer Mathematics. The girls constitute 60% of the total number of students. If a student is selected at random and is found to be studying Mathematics, the probability that the student is a girl, is
- (a) $\frac{1}{6}$ (b) $\frac{3}{8}$ (c) $\frac{5}{8}$ (d) $\frac{5}{6}$
17. There are m persons sitting in a row. Two of them are selected at random. The probability that the two selected persons are not together, is
- (a) $\frac{2}{m}$ (b) $1 - \frac{2}{m}$ (c) $\frac{m(m-1)}{(m+1)(m+2)}$ (d) None of these
18. If the integers m and n are chosen at random between 1 and 100, then the probability that a number of the form $7^m + 7^n$ is divisible by 5 equals
- (a) $\frac{1}{4}$ (b) $\frac{1}{7}$ (c) $\frac{1}{8}$ (d) $\frac{1}{49}$
19. Cards are drawn one by one at random from a well shuffled full pack of 52 cards until two aces are obtained for the first time. If N is the number of cards required to be drawn, then $P_r[N = n]$, where $2 \leq n \leq 50$, is
- (a) $\frac{(n-1)(52-n)(51-n)}{50 \times 49 \times 17 \times 13}$ (b) $\frac{2(n-1)(52-n)(51-n)}{50 \times 49 \times 17 \times 13}$ (c) $\frac{3(n-1)(52-n)(51-n)}{50 \times 49 \times 17 \times 13}$ (d) $\frac{4(n-1)(52-n)(51-n)}{50 \times 49 \times 17 \times 13}$
20. 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
21. Seven white balls and three black balls are randomly placed in a row. The probability that no two black balls are placed adjacently equals
- (a) $\frac{1}{2}$ (b) $\frac{7}{15}$ (c) $\frac{2}{15}$ (d) $\frac{1}{3}$
22. A committee consists of 9 experts taken from three institutions A , B and C , of which 2 are from A , 3 from B and 4 from C . If three experts resign, then the probability that they belong to different institutions is
- (a) $\frac{1}{729}$ (b) $\frac{1}{24}$ (c) $\frac{1}{21}$ (d) $\frac{2}{7}$
23. There are four machines and it is known that exactly two of them are faulty. They are tested, one by one, in a random order till both the faulty machines are identified. The probability that only two tests are needed is
- (a) $\frac{1}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$
24. A five digit number is formed by writing the digits 1, 2, 3, 4, 5 in a random order without repetitions. Then the probability that the number is divisible by 4 is
- (a) $\frac{3}{5}$ (b) $\frac{18}{5}$ (c) $\frac{1}{5}$ (d) $\frac{6}{5}$
25. Five persons entered the lift cabin on the ground floor of an 8-floor house. Suppose that each of them independently and with equal probability can leave the cabin at any floor beginning with the first. The probability of all five persons leaving at different floors is
- (a) $\frac{7^5}{{}^7P_5}$ (b) $\frac{{}^7P_5}{7^5}$ (c) $\frac{5!}{7^5}$ (d) 1
26. If A and B are two events then the value of the determinant chosen at random from all the determinants of order 2 with entries 0 or 1 only is positive or negative respectively. Then

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- (a) $P(A) \geq P(B)$ (b) $P(A) \leq P(B)$ (c) $P(A) = P(B) = 1/2$ (d) None of these
27. $x_1, x_2, x_3, \dots, x_{50}$ are fifty real numbers such that $x_r < x_{r+1}$ for $r = 1, 2, 3, \dots, 49$. Five numbers out of these are picked up at random. The probability that the five numbers have x_{20} as the middle number is
- (a) $\frac{{}^{20}C_2 \times {}^{30}C_2}{{}^{50}C_5}$ (b) $\frac{{}^{30}C_2 \times {}^{19}C_2}{{}^{50}C_5}$ (c) $\frac{{}^{19}C_2 \times {}^{31}C_3}{{}^{50}C_5}$ (d) None of these
28. A card is drawn from a pack. The card is replaced and the pack is reshuffled. If this is done six times, the probability that 2 hearts, 2 diamonds and 2 black cards are drawn is
- (a) $90 \cdot \left(\frac{1}{4}\right)^6$ (b) $\frac{45}{2} \cdot \left(\frac{3}{4}\right)^4$ (c) $\frac{90}{2^{10}}$ (d) None of these
29. An even number of cards is drawn from a pack of 52 cards. The probability that half of these cards will be red and the other half black is
- (a) $\frac{{}^{52}C_2}{{}^{2^{51}} - 1}$ (b) $\frac{{}^{52}C_{26} - 1}{{}^{2^{51}} - 1}$ (c) $\frac{{}^{52}C_2 - 1}{{}^{2^{51}} - 1}$ (d) $\frac{{}^{52}C_2}{{}^{2^{51}} + 1}$
30. Two numbers a and b are chosen at random from the set $\{1, 2, 3, \dots, 3n\}$ the probability that $a^2 - b^2$ is divisible by 3 is
- (a) $\frac{5(n-3)}{3n-1}$ (b) $\frac{5(n+3)}{3n-1}$ (c) $\frac{5n-3}{3(3n-1)}$ (d) None of these
31. The probability that the birth days of six different persons will fall in exactly two calendar months is
- (a) $\frac{1}{6}$ (b) ${}^{12}C_2 \times \frac{2^6}{12^6}$ (c) ${}^{12}C_2 \times \frac{2^6 - 1}{12^6}$ (d) $\frac{341}{12^5}$
32. A bag contains n white and n red balls. Pairs of balls are drawn without replacement until the bag is empty. The probability of each pair consisting of balls of different colours is
- (a) $\frac{2^n}{{}^{2n}C_n}$ (b) $\frac{2^{n-1}}{{}^{2n}C_n}$ (c) $\frac{2^n}{{}^{2n-1}C_n}$ (d) 1
33. To avoid detection at customs, a traveller has placed six narcotic tablets in a bottle containing nine vitamin pills that are similar in appearance. If the customs official selects three of the tablets at random for analysis, the probability that traveller will be arrested for illegal possession of narcotics is
- (a) $\frac{53}{63}$ (b) $\frac{53}{65}$ (c) $\frac{51}{65}$ (d) $\frac{13}{63}$
34. Six different balls are put in three different boxes, no box being empty. The probability of putting balls in the boxes in equal numbers is
- (a) $3/10$ (b) $1/6$ (c) $1/5$ (d) None of these
35. A man and a woman appear in an interview for two vacancies in the same post. The probability of man's selection is $1/4$ and that of woman's selection is $1/3$. What is the probability that none of them will be selected
- (a) $1/2$ (b) $1/12$ (c) $1/4$ (d) None of these
36. Three six faced unbiased dice are thrown together. The probability that exactly two of the three numbers are equal is
- (a) $117/216$ (b) $5/12$ (c) $165/216$ (d) None of these
37. If the papers of 4 students can be checked by any one of the seven teachers, then the probability that all the four papers are checked by exactly two teachers is
- (a) $2/7$ (b) $12/49$ (c) $32/343$ (d) None of these
38. m boys and m girls take their seats randomly around a circle. The probability of their sitting is $({}^{2m-1}C_m)^{-1}$ when
- (a) No two boys sit together (b) No two girls sit together
(c) Boys and girls sit alternatively (d) All the boys sit together
39. m men and w women seat themselves at random on $m+w$ seats arranged in row (circle). If $p_1(p_2)$ denote the probability of all women sitting together when they are arranged in row (circle), then

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- (a) $p_1 = \frac{m+1}{m+w} C_m$ (b) $p_1 + p_2 = \frac{2m+w+1}{m+w} C_m$ (c) $p_1 = p_2$ if and only if $w = 1$ (d) $p_2 < p_1$ if $w > 1$
40. Three player A, B and C , toss a coin cyclically in that order (that is $A, B, C, A, B, C, A, B, \dots$) till a head shows. Let p be the probability that the coin shows a head. Let α, β and γ be, respectively, the probabilities that A, B and C gets the first head. Then
 (a) $\beta = (1-p)\alpha$ (b) $\gamma + 2p\alpha = (1+p^2)\alpha$ (c) $\alpha + \beta + \gamma = 1$ (d) $\alpha = 1/(3-3p+p^2)$
41. Two players A and B toss a fair coin cyclically in the following order A, A, B, A, A, B, \dots till a head shows (that is, A will be allowed first two tosses, followed by a single toss of B). Let $\alpha(\beta)$ denote the probability that $A(B)$ gets the head first. Then
 (a) $\alpha = 6/7$ (b) $\alpha = 5/7$ (c) $\beta = 1/7$ (d) $\beta = 2/7$
42. Three political parties are contesting election for $(2n+1)$ Lok Sabha seats. the probability that there will be a coalition government after the election is
 (a) $\frac{4n+6}{n}$ (b) $\frac{n}{4n+6}$ (c) $\frac{n}{2n+3}$ (d) 1
43. A and B each throw a dice. The probability that A 's throw is not greater than B 's is
 (a) $1/6$ (b) $5/12$ (c) $1/2$ (d) $7/12$
44. A binary operation is chosen at random from the set of all binary operations on a set A containing n elements. The probability that the binary operation is commutative is
 (a) $\frac{n^n}{n^{n^2}}$ (b) $\frac{n^{n/2}}{n^{n^2}}$ (c) $\frac{n^{n/2}}{n^{n^2/2}}$ (d) None of these
45. Let a die is loaded in such a way that even faces are twice as likely to occur as the odd faces. The probability that a prime number will show up when the die is tossed is
 (a) $\frac{2}{9}$ (b) $\frac{4}{9}$ (c) $\frac{1}{9}$ (d) $\frac{2}{3}$
46. A special die with numbers $1, -1, 2, -2, 0$ and 3 is thrown thrice. The probability that the total is zero is
 (a) $\frac{25}{216}$ (b) $\frac{214}{217}$ (c) $\frac{11}{216}$ (d) None of these
47. If four small squares are chosen at random on a chess board, the probability that they lie on a diagonal line is
 (a) $\frac{13}{22692}$ (b) $\frac{11}{22692}$ (c) $\frac{7}{22692}$ (d) $\frac{2}{7}$
48. A letter is taken at random out of each of the words CHOICE and CHANCE. The probability that they should be the same letter is
 (a) $1/6$ (b) $1/9$ (c) $5/36$ (d) $1/324$
49. Let X be a set containing n elements. If two subsets A and B of X are picked at random, the probability that A and B have the same number of elements is
 (a) $\frac{2^n C_n}{2^{2n}}$ (b) $\frac{1}{2^n C_n}$ (c) $\frac{1.3.5 \dots (2n-1)}{2^n (n!)}$ (d) $\frac{3^n}{4^n}$
50. A four figure number is formed of the figures $1, 2, 3, 5$ with no repetitions. The probability that the number is divisible by 5 is
 (a) $3/4$ (b) $1/4$ (c) $1/8$ (d) None of these