

Probability and Statistics

Counting Techniques & Introduction to Probability

DPP

1. If there are 6 girls and 5 boys who sit in a row, then the probability that no two boys sit together is
 - (a) $\frac{6!6!}{2!11!}$
 - (b) $\frac{7!5!}{2!11!}$
 - (c) $\frac{6!7!}{2!11!}$
 - (d) None of these
2. Three integers are chosen at random from the first 20 integers. The probability that their product is even
 - (a) $2/19$
 - (b) $3/29$
 - (c) $17/19$
 - (d) $4/29$
3. One hundred cards are numbered from 1 to 100. The probability that a randomly chosen card has a digit 5 is
 - (a) $1/100$
 - (b) $9/100$
 - (c) $19/100$
 - (d) None of these
4. If the letters of word 'REGULATIONS' be arranged at random, the probability that there will be exactly 4 letters between R and E is:
 - (a) $6/55$
 - (b) $3/55$
 - (c) $49/55$
 - (d) None of these
5. In a bag there are three tickets numbered 1, 2, 3. A ticket is drawn at random and put back, and this is done four times the probability of that the sum of the numbers is even is:
 - (a) $41/81$
 - (b) $39/81$
 - (c) $40/81$
 - (d) None of these
6. A pack of cards consists of 15 cards numbered 1 to 15. Three cards are drawn at random with replacement.

Then, the probability of getting 2 odd and one even numbered card is:

 - (a) $348/1125$
 - (b) $398/1125$
 - (c) $448/1125$
 - (d) $498/1125$
7. Three persons A, B and C are to speak at a function along with five others. If they all speak in random order, the probability that A speaks before B and B speaks before C is:
 - (a) $3/8$
 - (b) $1/6$
 - (c) $3/5$
 - (d) None of these
8. An elevator starts with m passengers and stops at n floors ($m \leq n$) the probability that no two passengers alight at same floor is:
 - (a) $\frac{{}^nP_m}{m^n}$
 - (b) $\frac{{}^nP_m}{n^m}$
 - (c) $\frac{{}^nC_m}{m^n}$
 - (d) $\frac{{}^nC_m}{n^m}$
9. A and B play a game where each is asked to select a number from 1 to 25. If the two numbers match both of them win a prize. The probability that they will not win a prize in a single trial is:
 - (a) $1/25$
 - (b) $24/25$
 - (c) $2/25$
 - (d) None of these
10. Fifteen persons among whom are A and B, sit down randomly at round table. The probability that there are 4 persons between A and B is:
 - (a) $\frac{9!}{14!}$
 - (b) $\frac{10!}{14!}$
 - (c) $\frac{9!}{15!}$
 - (d) None of these
11. The probability that the 13th day of a randomly chosen month is a second Saturday is:
 - (a) $1/7$
 - (b) $1/12$

- (c) $1/84$ (d) $19/84$
12. Three of the six vertices of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral, is:
 (a) $1/2$ (b) $1/5$
 (c) $1/10$ (d) $1/20$
13. The probability that out of 10 persons, all born in April, at least two have the same birthday is:
 (a) $\frac{{}^{30}C_{10}}{(30)^{10}}$ (b) $1 - \frac{{}^{30}C_{10}}{30!}$
 (c) $\frac{(30)^{10} - {}^{30}C_{10}}{(30)^{10}}$ (d) None of these
14. If A and B are two events, the probability that exactly one of them occurs is given by:
 (a) $P(A) + P(B) - 2P(A \cap B)$
 (b) $P(A \cap \bar{B}) + P(\bar{A} \cap B)$
 (c) $P(A \cup B) - P(A \cap B)$
 (d) $P(\bar{A}) + P(\bar{B}) - 2P(\bar{A} \cap \bar{B})$
15. If A and B are events at the same experiments with $P(A) = 0.2$, $P(B) = 0.5$, then maximum value of $P(A \cap B)$ is
 (a) $1/4$ (b) $1/2$
 (c) $1/8$ (d) $1/16$
16. The probabilities that a student passes in mathematics, physics and chemistry are m, p and c respectively. Of these subjects, a student has a 75% chance of passing in at least one, a 50% chance of passing in at least one, 50% chance of passing in at least two and a 40% chance of passing in exactly two subjects. Which of the following relations are true?
 (a) $p + m + c = \frac{19}{20}$
 (b) $p + m + c = \frac{27}{20}$
 (c) $pmc = \frac{1}{10}$
- (d) $pmc = \frac{1}{4}$
17. A coin is tossed n times. The probability of getting at least one head is greater than that of getting at least two tails by $5/32$. Then n is:
 (a) 5 (b) 10
 (c) 15 (d) None of these
18. Suppose that
 Box-I contains 8 red, 3 blue and 5 green balls,
 Box-II contains 24 red, 9 blue and 15 green balls,
 Box-III contains 1 blue, 12 green and 3 yellow balls,
 Box-IV contains 10 green, 16 orange and 6 white balls.
 A ball is chosen randomly from Box-I; call this ball b. If b is red then a ball is chosen randomly from Box-II, if b is blue then a ball is chosen randomly from Box-III, and if b is green then a ball is chosen randomly from Box-IV. The conditional probability of the event 'one of the chosen balls is white' given that the event 'at least one of the chosen balls is green' has happened, is equal to
 (a) $15/256$
 (b) $3/16$
 (c) $5/52$
 (d) $1/8$
19. Consider three sets $E_1 = \{1, 2, 3\}$, $F_1 = \{1, 3, 4\}$ and $G_1 = \{2, 3, 4, 5\}$. Two elements are chosen at random, without replacement, from the set E_1 , and let S_1 denote the set of these chosen elements. Let $E_2 = E_1 - S_1$ and $F_2 = F_1 \cap S_1$. Now two elements are chosen at random, without replacement, from the set F_2 and let S_2 denote the set of these chosen elements.
 Let $G_2 = G_1 \cup S_2$. Finally, two elements are chosen at random, without replacement, from the set G_2 and let S_3 denote the set of these chosen elements.
 Let $E_3 = E_2 \cup S_3$. Given that $E_1 = E_3$, let p be the conditional probability of the event $S_1 = \{1, 2\}$. Then the value of p is
 (a) $1/5$
 (b) $3/5$
 (c) $1/2$
 (d) $2/5$
20. Three randomly chosen nonnegative integers x, y and z are found to satisfy the equation $x + y + z = 10$. Then the probability that z is even,
 (a) $36/55$ (b) $6/11$

(c) $1/2$ (d) $5/11$

21. There are three bags B_1 , B_2 and B_3 . The bag B_1 contains 5 red and 5 green balls, B_2 contains 3 red and 5 green balls, and B_3 contains 5 red and 3 green balls. Bags B_1 , B_2 and B_3 have probabilities $3/10$, $3/10$ and $4/10$ respectively of being chosen. A bag is selected at random, and a ball is chosen at random from the bag. Then which of the following options is/are correct?

(a) Probability that the chosen ball is green, given that the selected bag is B_3 , equals $3/8$

(b) Probability that the chosen ball is green equals $39/80$

(c) Probability that the selected bag is B_3 , given that the chosen ball is green, equals $5/13$

(d) Probability that the selected bag is B_3 and the chosen ball is green equals $3/10$

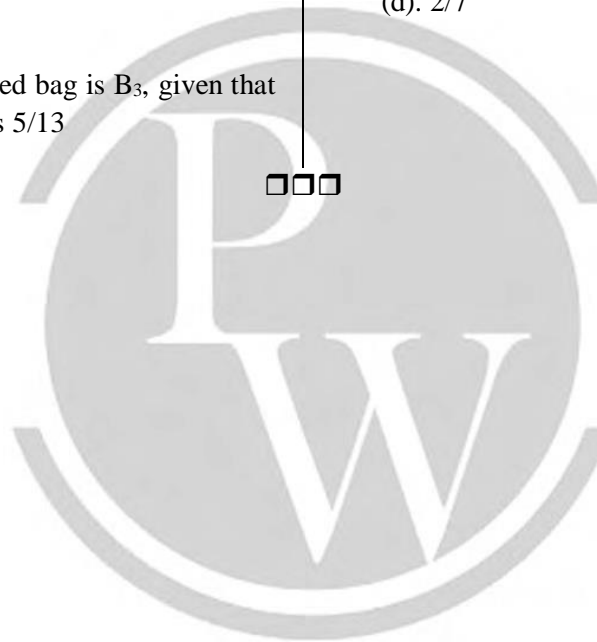
22. Consider an experiment of tossing a coin repeatedly until the outcomes of two consecutive tosses are same. If the probability of a random toss resulting in head is $1/3$, then the probability that the experiment stops with head is

(a). $1/3$

(b). $5/21$

(c). $4/21$

(d). $2/7$



Answer Key

1. (c)
2. (c)
3. (c)
4. (a)
5. (a)
6. (c)
7. (b)
8. (a)
9. (b)
10. (d)
11. (c)

12. (c)
13. (c)
14. (a,b,c,d)
15. (b)
16. (b,c)
17. (a)
18. (a)
19. (a)
20. (b)
21. (b,d)
22. (b)

□□□

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