



Probability Questions for CAT Set-3 PDF

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Instructions

For the following questions answer them individually

Question 1

Ashish is studying late into the night and is hungry. He opens his mother's snack cupboard without switching on the lights, knowing that his mother has kept 10 packets of chips and biscuits in the cupboard. He pulls out 3 packets from the cupboard, and all of them turn out to be chips. What is the probability that the snack cupboard contains 1 packet of biscuits and 9 packets of chips?

- A 6/55
- B 12/73
- C 14/55
- D 7/50

Answer: C

Explanation:

We are given that $C+B = 10$

Thus, the cases are $C=3$ and $B = 7$

$C = 4$ and $B = 6$

$C = 5$ and $B = 5$

$C = 6$ and $B = 4$

$C = 7$ and $B = 3$

$C = 8$ and $B = 2$

$C = 9$ and $B = 1$

$C = 10$ and $B = 0$

Our required case = $C = 9$ and $B = 1$

$$\begin{aligned}\text{Thus, the required probability} &= \frac{{}^{10}C_3 + {}^9C_3 + {}^8C_3 + {}^7C_3 + {}^6C_3 + {}^5C_3 + {}^4C_3 + {}^3C_3}{{}^{14}C_3} \\ &= \frac{14}{55}\end{aligned}$$

Hence, option C is the correct answer.

Question 2

The answer sheets of 5 engineering students can be checked by any one of 9 professors. What is the probability that all the 5 answer sheets are checked by exactly 2 professors?

- A 20/2187
- B 40/2187
- C 40/729
- D None of the above

Answer: B

Explanation:

Each of the 5 papers can be checked by any of the 9 professors and thus the total number of way = 9^5

Selecting exactly 2 of the 9 professors can be done in 9C_2 way = 36

They can correct the 5 papers in $2^5 - 2$ (all the 5 papers checked by the same professor) = 30 ways.

$$\text{Thus, the total number of ways} = \frac{36 \times 30}{9^5} = \frac{40}{2187}$$

$$\text{Hence, the required probability} = \frac{40}{2187}$$

Hence, option B is the correct answer.

Question 3

The probability that in a household LPG will last 60 days or more is 0.8 and that it will last at most 90 days is 0.6. The probability that the LPG will last 60 to 90 days is

- A 0.40
- B 0.50
- C 0.75
- D None of the above

Answer: A

Explanation:

The probability that the LPG will last atmost 90 days = 0.6

Thus, the probability that the LPG will last more than 90 days = 0.4

The probability that the LPG will last more than 60 days = 0.8 = The probability that the LPG will last 60 to 90 days +

The probability that the LPG will last more than 90 days

Hence, $0.4 + \text{The probability that the LPG will last 60 to 90 days} = 0.8$

Hence, The probability that the LPG will last 60 to 90 days = $0.8 - 0.4 = 0.4$

Hence, option A is the correct answer.

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Question 4

A research study recorded that the number of unemployed educated youth was equal to the number of unemployed uneducated youth. It was concluded by the researchers that being educated does not enhance the probability of being employed. Which of the following information would be required to validate the above conclusion?

- A The number unemployed educated and uneducated people in other age groups.
- B The number of organisations employing youth.
- C The percentage of unemployment in educated youth versus percentage of unemployment in uneducated youth.
- D The percentage increase in number of educated youth versus last year.

Answer: C

Explanation:

Consider the case,

Out of 1000 educated youth 10 are unemployed and out of 20 uneducated youth 10 are unemployed.

Thus, the number of unemployed educated youth was equal to the number of unemployed uneducated youth.

But as we see that the probability that an educated you will be unemployed is 1% and the probability that an uneducated youth is unemployed is 50%.

Thus, to validate the given conclusion we need the percentage of unemployment in educated youth versus percentage of unemployment in uneducated youth.

Hence, option C is the correct answer.

Question 5

Suppose there are 4 bags. Bag 1 contains 1 black and $a^2 - 6a + 9$ red balls, bag 2 contains 3 black and $a^2 - 6a + 7$ red balls, bag 3 contains 5 black and $a^2 - 6a + 5$ red balls and bag 4 contains 7 black and $a^2 - 6a + 3$ red balls. A ball is drawn at random from a randomly chosen bag. The maximum value of probability that the selected ball is black, is

- A $16/a^2 - 6a + 10$

- B $20/a^2 - 6a + 10$
- C $1/16$
- D None of the above

Answer: D

Explanation:

Let us take the value of $a^2 - 6a + 3 = x$.

Thus, the number of red balls in bag 1 = $x+6$

The number of red balls in bag 2 = $x+4$

The number of red balls in bag 3 = $x+2$

The number of red balls in bag 4 = x

Bag 4 will have the minimum number of red balls.

The probability of a black ball = $\frac{1}{4} \left[\frac{1}{x+7} \right] + \frac{1}{4} \left[\frac{3}{x+7} \right] + \frac{1}{4} \left[\frac{5}{x+7} \right] + \frac{1}{4} \left[\frac{7}{x+7} \right]$

In order to maximize the probability we need to minimize the value of x

The minimum value of x can be 0 as number of red balls cannot be negative.

Put $x=0$ we get $P(\text{Black ball}/\text{total}) = \frac{1}{4} \left[\frac{16}{(x+7)} \right] = \frac{4}{7}$

Hence, option D is the correct answer.

Question 6

Two trains P and Q are scheduled to reach New Delhi railway station at 10.00 AM. The probability that train P and train Q will be late is $\frac{7}{9}$ and $\frac{11}{27}$ respectively. The probability that train Q will be late, given that train P is late, is $\frac{8}{9}$. Then the probability that neither train will be late on a particular day is

- A $\frac{40}{81}$
- B $\frac{41}{81}$
- C $\frac{77}{81}$
- D $\frac{77}{243}$

Answer: B

Explanation:

Let 'A' and 'B' be the event of train reaching at the station respectively.

$P(A)_{\text{Late}} = \frac{7}{9}$, therefore, $P(A)_{\text{On time}} = \frac{2}{9}$.

$P(B)_{\text{Late}} = \frac{11}{27}$, therefore, $P(B)_{\text{On time}} = \frac{16}{27}$.

The probability that train Q will be late, given that train P is late, is $\frac{8}{9}$.

$P(B_{\text{Late}} | A_{\text{Late}}) = \frac{8}{9}$

$P(A_{\text{Late}} \cap B_{\text{Late}}) = P(A)_{\text{Late}} * P(B_{\text{Late}} | A_{\text{Late}})$

$P(A_{\text{Late}} \cap B_{\text{Late}}) = \frac{7}{9} * \frac{8}{9} = \frac{56}{81}$

Therefore, the probability that neither train is late = $1 - (P(A)_{\text{Late}} + P(B)_{\text{Late}} - P(A_{\text{Late}} \cap B_{\text{Late}}))$

$\Rightarrow 1 - (\frac{7}{9} + \frac{11}{27} - \frac{56}{81})$

$\Rightarrow \frac{41}{81}$

Hence, we can say that option B is the correct answer.

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Question 7

The game of “chuck-a-luck” is played at carnivals in some parts of Europe. Its rules are as follows: if you pick a number from 1 to 6 and the operator rolls three dice. If the number you picked comes up on all three dice, the operator pays you €3; if it comes up on two dice, you are paid €2; and if it comes up on just one die, you are paid €1. Only if the number you picked does not come up at all, you pay the operator €1. The probability that you will win money playing in this game is:

- A 0.52
- B 0.753
- C 0.42
- D None of these

Answer: C

Explanation:

There are 3 ways to win money in the game.

The number you picked can come up in one dice, 2 dice or 3 dice.

The probability of the number you picked coming in all three dice = $(1/6) \times (1/6) \times (1/6) = 1/216$

The probability of the number picked coming on 2 dice = $3C2 \times (5/6) \times (1/6) \times (1/6) = 15/216$

The probability of the number picked coming on 1 dice = $3C1 \times (5/6) \times (5/6) \times (1/6) = 75/216$

Probability of winning = $1/216 + 15/216 + 75/216 = 91/216 = 0.421$.

Therefore, option C is the right answer.

Question 8

In a reputed engineering college in Delhi, students are evaluated based on trimesters. The probability that an Engineering student fails in the first trimester is 0.08. If he does not fail in the first trimester, the probability that he is promoted to the second year is 0.87. The probability that the student will complete the first year in the Engineering College is approximately:

- A 0.8
- B 0.6
- C 0.4
- D 0.7

Answer: A

Explanation:

The probability that the student passes in the first trimester is 0.92

Now given that if the student passes in the first trimester then probability of moving into second second year is 0.87

Hence, the probability of completing first year is $0.92 \times 0.87 = 0.80$

Question 9

A dice is rolled twice. What is the probability that the number in the second roll will be higher than that in the first?

- A 5/36

- B** 8/36
C 15/36
D 21/36
E None of the above

Answer: C

Explanation:

A die is rolled twice.

The number of combinations that can occur = $6 \times 6 = 36$.

We have to find the probability of the second roll being higher than the first.

If we select 2 numbers out of the 6 and arrange them in ascending order, then we will obtain the scenario in which the number obtained in the second roll will be greater than the number obtained in the first roll.

2 numbers out of 6 numbers can be selected in $6C2 = 15$ ways. The numbers can be arranged in ascending order in only one way.

Therefore, the required probability is 15/36.

Therefore, option C is the right answer.

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Question 10

A coin of radius 3 cm is randomly dropped on a square floor full of square shaped tiles of side 10 cm each. What is the probability that the coin will land completely within a tile? In other words, the coin should not cross the edge of any tile.

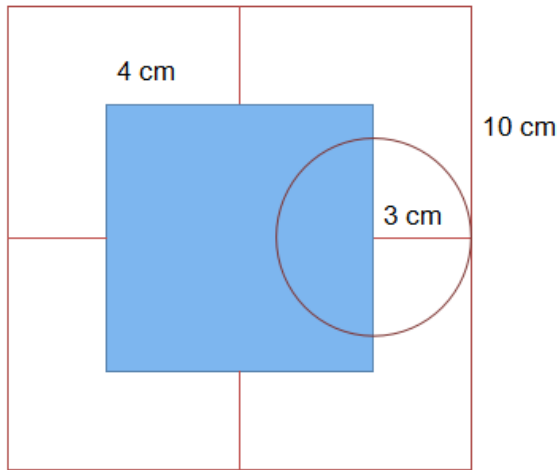
- A** 0.91
B 0.5
C 0.49
D 0.36
E 0.16

Answer: E

Explanation:

The radius of the coin is 3 cm.

So, if the coin should not cross the edge, the centre of the coin should at least be 3 cm away from the edge of the tile.



In the given diagram the center of the circle should lie in the blue region. As we can see, the area in which the centre of the coin can fall is a square of side $10 - 3 - 3 = 4$ cm.

Therefore, the area in which the centre of the coin can fall is 16 square cm.

Area of the tile = 100 square cm.

Required probability = $16/100 = 0.16$.

Therefore, option E is the right answer.

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