# Multiple Choice Qestions of Probability Theory

PRESENTED
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**Q:** A number is selected at random from first 90 natural numbers. The probability of the number selected being a multiple of 3 or 5 is:-

**A:** Let A be the event that the selected number is multiple of 3 and B be the event that the selected number is multiple of 5. n(A)= 30, n(B)=18.

$$n(A \cap B) = 6, \because \textit{the selected number will be the multiple of } 3 \textit{ and } 5.$$

$$\therefore \textit{The required probability is } P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cup B) = \frac{30}{90} + \frac{18}{90} - \frac{6}{90} = \frac{42}{90} = \frac{7}{15}$$

$$Q: If\ P(A\cap B)=0.4, P(neither\ A\ nor\ B\ occurs)=0.25\ and\ P(A)=P(B),$$
$$then\ P(A^C)=?$$

$$\because P(A\cap B)=0.4, P(A^C\cap B^C)=0.25\ and\ P(A)=P(B),$$
$$\therefore P(A\cup B)^C=0.25$$
$$or,\ P(A)+P(B)-P(A\cap B)=1-0.25$$
$$or,\ 2P(A)-0.4=0.75$$
$$or,\ P(A)=\frac{1.15}{2}=0.575$$
$$\therefore P(A^C)=1-0.575=0.425$$

$Q: If\ A\ and\ B\ are\ two\ independent\ events\ such\ that\ P(A \cup B) = 0.8,\ P(B) = k,$
$P(A^C) = 0.6,\ then\ k\ is:-?$

$$
\begin{aligned}
&P(A \cup B) = 0.8 \\
&or,\ P(A) + P(B) - P(A).P(B) = 0.8 \\
&or,\ 0.4 + k - 0.4k = 0.8 \\
&or,\ (1-0.4)k = 0.4 \\
&or,\ k = \frac{4}{6} = \frac{2}{3}
\end{aligned}
$$

$$
\begin{aligned}
&P(A \cap B) = P(A).P(B) \quad \because A\ and\ B\ are\ independent \\
&and\ P(A) = 1 - P(A^C) = 1 - 0.6 = 0.4
\end{aligned}
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$$Q: For\ two\ events\ A\ and\ B,\ P(B)=\frac{1}{3},\ P(B/A)=\frac{2}{3},\ P(A/B)=\frac{1}{2}, then$$

$$P(A)\ is:-?$$

$$P(A/B)=\frac{1}{2} \quad or,\ P(A\cap B)=\frac{1}{2}.P(B)=\frac{1}{2}.\frac{1}{3}=\frac{1}{6}$$

$$Now,\ P(B/A)=\frac{2}{3} \quad or,\ P(A\cap B)=\frac{2}{3}.P(A)$$

$$\therefore P(A)=\frac{1}{6}.\frac{3}{2}=\frac{1}{4}$$

**Q:** The probability to fail in Mathematics is 0.3 and the probability to fail in Statistics is 0.2, then the probability to fail in at least one subject is:-

**A:** Let A be the event of failing in Mathematics and B be the event of failing in Statistics.

$$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.3 + 0.2 - 0.3 * 0.2 = 0.5 - 0.06 = 0.44$$

$$\because A \textit{ and } B \textit{ are two independent events So, } P(A \cap B) = P(A).P(B)$$

**Q:** Two unbiased dice are thrown together. The probability that at least one will show its digit greater than 3 is:-

**A:** Let A be the event that more than 3 appears on the 1st die and B be the event that more than 3 appears on the 2nd die. A and B are independent.

$$So,\ P(A\cup B)=P(A)+P(B)-P(A\cap B)=\frac{1}{2}+\frac{1}{2}-\frac{1}{2}.\frac{1}{2}=\frac{3}{4}$$

$$\because P(A)=P(B)=\frac{1}{2}$$

$$\because A\ and\ B\ are\ two\ independent\ events$$

$$So,\ P(A\cap B)=P(A).P(B)$$

**Q:** The probabilities of happening of three independent events are $p_1$, $p_2$ and $p_3$ , then probability of happening of at least one of them is:-

$$Ans: The\ required\ probability\ is = 1-(1-p_1)(1-p_2)(1-p_3)$$

$$Q: If\ A\ and\ B\ are\ two\ events\ such\ that\ P(A\cup B)=\frac{3}{5}, P(A\cup B^C)=\frac{4}{5},$$

$$then\ P(A)\ is:-?$$

$$Ans: P(A\cup B)=P(A)+P(B)-P(A\cap B)=\frac{3}{5}$$

$$P(A\cup B^C)=P(A)+P(B^C)-P(A\cap B^C)=\frac{4}{5}$$

$$or,\quad P(A)+1-P(B)-P(A)+P(A\cap B)=\frac{4}{5}$$

$$or,\quad 1-\left[P(B)-P(A\cap B)\right]=\frac{4}{5}$$

$$or,\quad 1-\frac{3}{5}+P(A)=\frac{4}{5}$$

$$or,\quad P(A)=\frac{4}{5}+\frac{3}{5}-1=\frac{7}{5}-1=\frac{2}{5}$$

$$Q:\ If\ \ P(A)=0.36,\ P(B)=0.84,\ then\ the\ least\ value\ of$$
$$P(A\cap B)\ is:-?$$

$$Ans: We\ know\ that\ P(A\cap B)\geq P(A)+P(B)-1$$
$$\therefore P(A\cap B)\geq 0.36+0.84-1=0.2$$
$$So,\ least\ value\ of\ \ P(A\cap B)\ is\ 0.2$$

$$Q: If\ \ P(A)=\frac{1}{3},\ P(B)=\frac{1}{4},\ then\ \max imum\ value\ of\ \ P(A\cup B)\ is:-?$$

$$Ans: We\ know\ that\ \ P(A\cup B)\le \min\{P(A)+P(B),1\}$$

$$\therefore\ P(A\cup B)\le \min\left\{\frac{1}{3}+\frac{1}{4},1\right\}$$

$$So,\ \max.\ value\ of\ \ P(A\cup B)=\frac{7}{12}$$

# Thank you……..