

Answer on Question #46076 - Math - Statistics and Probability

If A and B are two events with probabilities 0.25 and 0.5 corresponding to A and $A \cup B$ respectively, then find the probability of B if

- (i) A and B are mutually exclusive
- (ii) A and B are independent
- (iii) B contains A.

Solution

(i) If A and B are mutually exclusive, then $P(A \cap B) = 0$

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

$$P(B) = P(A \cup B) - P(A) = 0.5 - 0.25$$

(ii) If A and B are independent, then $P(A \cap B) = P(A) * P(B)$

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

$$P(B) = \frac{P(A \cup B) - P(A)}{1 - P(A)} = \frac{0.5 - 0.25}{1 - 0.25} = \frac{1}{3}$$

(iii) If B contains A, then $P(B) = P(A \cup B) = 0.5$