

Exemplar Problem

Q. 73 Two events E and F are independent. If $P(E) = 0.3$ and $P(E \cup F) = 0.5$, then $P(E/F) - P(F/E)$ equals to

(a) $\frac{2}{7}$

(b) $\frac{3}{35}$

(c) $\frac{1}{70}$

(d) $\frac{1}{7}$

Sol. (c) Here, $P(E) = 0.3$ and $P(E \cup F) = 0.5$

Let

$$P(F) = x$$

\therefore

$$\begin{aligned} P(E \cup F) &= P(E) + P(F) - P(E \cap F) \\ &= P(E) + P(F) - P(E) \cdot P(F) \end{aligned}$$

\Rightarrow

$$0.5 = 0.3 + x - 0.3x$$

\Rightarrow

$$x = \frac{0.5 - 0.3}{0.7} = \frac{2}{7} = P(F)$$

\therefore

$$\begin{aligned} P(E/F) - P(F/E) &= \frac{P(E \cap F)}{P(F)} - \frac{P(F \cap E)}{P(E)} \\ &= \frac{P(E \cap F) \cdot P(E) - P(F \cap E) \cdot P(F)}{P(E) \cdot P(F)} \\ &= \frac{P(E \cap F) [P(E) - P(F)]}{P(E \cap F)} = P(E) - P(F) \\ &= \frac{3}{10} - \frac{2}{7} = \frac{21 - 20}{70} = \frac{1}{70} \end{aligned}$$