QUESTION
You are given the following probabilities relating to two events A and B,
$P(A) = 0.5, P(B) = 0.7, P(A \text{ or } B) = 0.8$. Calculate

(i) $P(A \text{ and } B)$

(ii) $P(A \text{ and not } B)$

(iii) $P(A|B)$

ANSWER

(i)

$$
\begin{aligned}
P(A \text{ and } B) &= P(A) + P(B)_P(A \text{ or } B) \text{ by addition theorem} \\
&= 0.5 + 0.7 - 0.8 = 0.4
\end{aligned}
$$

(ii) $P(A \text{ and not } B) + P(A \text{ and} B) = P(A)$ (since (A and not B) or (A and B)=A, (A and not B) and (A and B)=ϕ Therefore
$P(A \text{ and not } B) = 0.5 - 0.4 = 0.1$

(iii) $P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{0.4}{0.5} = 0.8$