

PROBABILITY

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13.1.3 ¹ If $\Pr(A) = 0.8$, $\Pr(B) = 0.5$ and $\Pr(B|A) = 0.4$, find

- (i) $\Pr(A, B)$
- (ii) $\Pr(A|B)$
- (iii) $\Pr(A + B)$

Solution:

13.2.3 (i) $\Pr(A, B)$

Now, we know that

$$\Pr(B|A) = \frac{\Pr(A, B)}{\Pr(A)} \quad (13.2.3.1)$$

$$0.4 = \frac{\Pr(A, B)}{\Pr(A)} \quad (13.2.3.2)$$

$$0.4 = \frac{\Pr(A, B)}{0.8} \quad (13.2.3.3)$$

$$\Pr(A, B) = 0.4 \times 0.8 \quad (13.2.3.4)$$

$$\Pr(A, B) = 0.32 \quad (13.2.3.5)$$

13.3.3 (ii) $\Pr(A|B)$

$$\Pr(A|B) = \frac{\Pr(A, B)}{\Pr(B)} \quad (13.3.3.1)$$

$$= \frac{\Pr(B|A) \Pr(A)}{\Pr(B)} \quad (13.3.3.2)$$

$$= \frac{0.4 \times 0.8}{0.5} \quad (13.3.3.3)$$

$$= \frac{0.32}{0.5} \quad (13.3.3.4)$$

$$= 0.64 \quad (13.3.3.5)$$

$$\Pr(A|B) = 0.64 \quad (13.3.3.6)$$

¹Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)

13.4.3 (iii) $\Pr(A + B)$

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(A, B) \quad (13.4.3.1)$$

$$\textit{Substitute}(\textcolor{red}{13.2.3.5})\textit{in}(\textcolor{red}{13.4.3.1}) \quad (13.4.3.2)$$

$$= 0.8 + 0.5 - 0.32 \quad (13.4.3.3)$$

$$= 1.3 - 0.32 \quad (13.4.3.4)$$

$$= 0.98 \quad (13.4.3.5)$$

$$\Pr(A + B) = 0.98 \quad (13.4.3.6)$$