

# PROBABILITY

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- 13.1.3** <sup>1</sup> 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:** (i)  $\Pr(A, B)$

Now, we know that

$$\Pr(B|A) = \frac{\Pr(A, B)}{\Pr(A)} \quad (13.1.3.1)$$

$$0.4 = \frac{\Pr(A, B)}{\Pr(A)} \quad (13.1.3.2)$$

$$0.4 = \frac{\Pr(A, B)}{0.8} \quad (13.1.3.3)$$

$$\Pr(A, B) = 0.4 \times 0.8 \quad (13.1.3.4)$$

$$\boxed{\Pr(A, B) = 0.32} \quad (13.1.3.5)$$

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

$$\Pr(A|B) = \frac{\Pr(A, B)}{\Pr(B)} \quad (13.1.3.6)$$

$$\frac{\Pr(B|A) \Pr(A)}{\Pr(B)}. \quad (13.1.3.7)$$

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<sup>1</sup>Read question numbers as (CHAPTER NUMBER).(EXERCISE NUMBER).(QUESTION NUMBER)

$$\frac{0.4 \times 0.8}{0.5} \quad (13.1.3.8)$$

$$= \frac{0.32}{0.5} \quad (13.1.3.9)$$

$$= 0.64 \quad (13.1.3.10)$$

$$\boxed{\Pr(A|B) = 0.64} \quad (13.1.3.11)$$

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

$$\Pr(A + B) = \Pr(A) + \Pr(B) - \Pr(A, B) \quad (13.1.3.12)$$

Substitute (13.1.3.5) in (13.1.3.12)

$$= 0.8 + 0.5 - 0.32 \quad (13.1.3.13)$$

$$= 1.3 - 0.32 \quad (13.1.3.14)$$

$$= 0.98 \quad (13.1.3.15)$$

$$\boxed{\Pr(A + B) = 0.98} \quad (13.1.3.16)$$