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:
(i)$\Pr(A, B)$
Now, we know that

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

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

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

$$\Pr(A, B) = 0.4 \times 0.8 \tag{13.1.3.4}$$

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

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

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

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

$$\frac{0.4 \times 0.8}{0.5} \tag{13.1.3.8}$$

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

$$= \frac{0.32}{0.5} \tag{13.1.3.9}$$

$$= 0.64 \tag{13.1.3.10}$$

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

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

$$\Pr(A+B) = \Pr(A) + \Pr(B) - \Pr(A,B) \tag{13.1.3.12}$$

Substitute (13.1.3.5) in (13.1.3.12)

$$= 0.8 + 0.5 - 0.32 \tag{13.1.3.13}$$

$$= 1.3 - 0.32 \tag{13.1.3.14}$$

$$= 0.98 \tag{13.1.3.15}$$

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