

Assignment 5

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CBSE Probability Grade 12

Exercise 13.1 11 A fair die is rolled. Consider (ii)
events $E = \{1,3,5\}$, $F = \{2,3\}$ and $G = \{2,3,4,5\}$.

Find

- (i) $\Pr(E|F)$ and $\Pr(F|E)$
- (ii) $\Pr(E|G)$ and $\Pr(G|E)$
- (iii) $\Pr((E \cup F)|G)$ and $\Pr((E \cap F)|G)$

Solution.

Let sample space $S = \{1,2,3,4,5,6\}$.

| Event | Set |
|----------|-----------------|
| E | $\{1,3,5\}$ |
| F | $\{2,3\}$ |
| G | $\{2,3,4,5\}$ |
| $E+F$ | $\{1,2,3,5\}$ |
| EF | $\{3\}$ |
| $E+G$ | $\{1,2,3,4,5\}$ |
| EG | $\{3,5\}$ |
| $(E+F)G$ | $\{2,3,5\}$ |
| $(EF)G$ | $\{3\}$ |

TABLE 1: Events

(i)

$$\Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} \quad (1)$$

$$= \frac{\frac{1}{6}}{\frac{2}{6}} \quad (2)$$

$$= \frac{1}{2} \quad (3)$$

$$\Pr(F|E) = \frac{\Pr(EF)}{\Pr(E)} \quad (4)$$

$$= \frac{\frac{1}{6}}{\frac{3}{6}} \quad (5)$$

$$= \frac{1}{3} \quad (6)$$

$$\Pr(E|G) = \frac{\Pr(EG)}{\Pr(G)} \quad (7)$$

$$= \frac{\frac{2}{6}}{\frac{4}{6}} \quad (8)$$

$$= \frac{1}{2} \quad (9)$$

$$\Pr(G|E) = \frac{\Pr(EG)}{\Pr(E)} \quad (10)$$

$$= \frac{\frac{2}{6}}{\frac{3}{6}} \quad (11)$$

$$= \frac{2}{3} \quad (12)$$

(iii)

$$\Pr(E + F|G) = \frac{\Pr((E + F)G)}{\Pr(G)} \quad (13)$$

$$= \frac{\frac{3}{6}}{\frac{4}{6}} \quad (14)$$

$$= \frac{3}{4} \quad (15)$$

$$\Pr((EF)|G) = \frac{\Pr((EF)G)}{\Pr(G)} \quad (16)$$

$$= \frac{\frac{1}{6}}{\frac{4}{6}} \quad (17)$$

$$= \frac{1}{4} \quad (18)$$