

AI-1110 Assignment-1

NAME: M Bhavesh Chowdary

ROLLNO: cs22btech11041

12.13.1.11 Question: A fair die is rolled. Consider events $E = \{1,3,5\}$, $F = \{2,3\}$ and $G = \{2,3,4,5\}$. Find

- 1) $\Pr(E|F)$ and $\Pr(F|E)$
- 2) $\Pr(E|G)$ and $\Pr(G|E)$
- 3) $\Pr((E + F)|G)$ and $\Pr((EF)|G)$

4)

Solution: Sample space when a die is rolled = $\{1,2,3,4,5,6\}$.

$E = \{1,3,5\}$	$\Pr(E) = 1/2$
$F = \{2,3\}$	$\Pr(F) = 1/3$
$G = \{2,3,4,5\}$	$\Pr(G) = 2/3$
$EF = \{3\}$	$\Pr(EF) = 1/6$
$FG = \{2,3\}$	$\Pr(FG) = 1/3$
$EG = \{3,5\}$	$\Pr(EG) = 1/3$
$EFG = \{3\}$	$\Pr(EFG) = 1/6$

TABLE 3: From given data

1)

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

table 3,

$$\Pr(E|F) = \frac{1/6}{1/3} \quad (2)$$

$$\Pr(E|F) = 1/2 \quad (3)$$

2)

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

table 3,

$$\Pr(F|E) = \frac{1/6}{1/2} \quad (5)$$

$$\Pr(F|E) = 1/3 \quad (6)$$

3)

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

table 3,

$$\Pr(E|G) = \frac{1/3}{2/3} \quad (8)$$

$$\Pr(E|G) = 1/2 \quad (9)$$

table 3,

$$\Pr(G|E) = \frac{1/3}{1/2} \quad (11)$$

$$\Pr(G|E) = 2/3 \quad (12)$$

5)

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

$$\Pr((E + F)G) = \Pr((EG) + (FG)) \quad (14)$$

$$\Pr((E + F)G) = \Pr(EG) + \Pr(FG) - \Pr((EF)G) \quad (15)$$

table 3,

$$\Pr((E + F)G) = 1/3 + 1/3 - 1/6 \quad (16)$$

$$\Pr((E + F)G) = 1/2 \quad (17)$$

$$\Pr((E + F)|G) = \frac{1/2}{2/3} \quad (18)$$

$$\Pr((E + F)|G) = 3/4 \quad (19)$$

6)

$$\Pr((EF)|G) = \frac{\Pr(EFG)}{\Pr(G)} \quad (20)$$

table 3,

$$\Pr((EF)|G) = \frac{1/6}{2/3} \quad (21)$$

$$\Pr((EF)|G) = 1/4 \quad (22)$$

Answer:

$$\Pr(E|F) = 1/2, \quad (23)$$

$$\Pr(F|E) = 1/3, \quad (24)$$

$$\Pr(E|G) = 1/2, \quad (25)$$

$$\Pr(G|E) = 2/3, \quad (26)$$

$$\Pr((E + F)|G) = 3/4, \quad (27)$$

$$\Pr((EF)|G) = 1/4 \quad (28)$$