

# Assignment 5

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**Question:** A black and a red dice is rolled.

- 1) Find the conditional probability of obtaining a sum greater than 9, given that the black die resulted in a 5.
- 2) Find the conditional probability of obtaining the sum 8, given that the red die resulted in a number less than 4.

**Solution:** In the question two dice red and black are rolled.

$\therefore$  the number of elements in the sample space  $n(S)=36$

- 1) Let us take the event of the sum being greater than 9 be  $E$  and the event of black die rolling 5 be  $F$ .

Then,

$$E = \{(4,6),(5,5),(5,6),(6,4),(6,5),(6,6)\}$$

$$F = \{(5,1),(5,2),(5,3),(5,4),(5,5),(5,6)\}$$

Now,

$$E \cap F = \{(5,5),(5,6)\}$$

$$\therefore n(E \cap F) = 2, n(F) = 6$$

$$\text{So, } P(E \cap F) = \frac{2}{36} \quad (1)$$

$$P(F) = \frac{6}{36} \quad (2)$$

From (1) and (2)

$$P(E|F) = \frac{P(E \cap F)}{P(F)} \quad (3)$$

$$= \frac{\frac{2}{36}}{\frac{6}{36}} \quad (4)$$

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

- 2) Let us take the event of the sum being 8 be  $M$  and the event of red die rolling less than 4 be  $N$ .

Then,

$$M = \{(2,6),(3,5),(4,4),(5,3),(6,2)\}$$

$$N = \{(1,1),(1,2),(1,3),(2,1),(2,2),(2,3),(3,1),(3,2), \\ (3,3),(4,1),(4,2),(4,3),(5,1),(5,2),(5,3),(6,1),(6,2), \\ (6,3)\}$$

Now,

$$M \cap N = \{(5,3),(6,2)\}$$

$$\therefore n(M \cap N) = 2, n(N) = 18$$

$$\text{So, } P(M \cap N) = \frac{2}{36} \quad (6)$$

$$P(N) = \frac{18}{36} \quad (7)$$

From (6) and (7)

$$P(M|N) = \frac{P(M \cap N)}{P(N)} \quad (8)$$

$$= \frac{\frac{2}{36}}{\frac{18}{36}} \quad (9)$$

$$= \frac{1}{9} \quad (10)$$