Assignment 1

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Download all python codes from

https://github.com/Sushma−AI1103/Assignment−1/blob/main/assingment_1code.py

1 Problem

(4.12) Determine P(E|F),if a die is thrown three times,
E : 4 appears on third toss
F : 6 and 5 appears on respectively on first and second toss.

2 Solution

Throwing a die three times is similar to throw three die simultaneously as every trial is independent.

Let $X_i = \{1, 2, 3, 4, 5, 6\}$ where i = 1, 2, 3
Now , for a fair die , all events are equally likely. Therefore ,

$$\begin{aligned} \Pr(X_i = n) &= \frac{1}{6} \quad 1 \le n \le 6 \\ &= 0 \quad otherwise \end{aligned} \tag{2.0.1}$$

probability of event E ,

$$\Pr(E) = \Pr(X_3 = 4) = \frac{1}{6}$$

(2.0.2)

similarly, Probability of event F would be ,

$$\begin{aligned} \Pr(F) &= \Pr(X_1 = 6, X_2 = 5) \\ &= \Pr(X_1 = 6)\Pr(X_2 = 5) \\ &= \frac{1}{6}.\frac{1}{6} = \frac{1}{36} \end{aligned}$$

since events are independent .

Now , Probability of E and F would be

$$\begin{aligned} \Pr(EF) &= \Pr(X_1 = 6, X_2 = 5, X_3 = 4) \\ &= \Pr(X_1 = 6)\Pr(X_2 = 5)\Pr(X_3 = 4) \\ &= \frac{1}{6}.\frac{1}{6}.\frac{1}{6} \\ &= \frac{1}{216} \end{aligned} \tag{2.0.3}$$

Probability P(E|F) ,

$$\begin{aligned} P(E \mid F) &= \frac{\Pr(EF)}{\Pr(F)} \\ &= \frac{\frac{1}{216}}{\frac{1}{36}} \\ &= \frac{1}{6} \end{aligned}$$