Assignment 1

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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 ,

$$Pr(X_i = n) = \frac{1}{6} \quad 1 \le n \le 6$$
$$= 0 \quad otherwise$$

(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 ,

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

since events are independent .

Now , Probability of E and F would be

$$Pr(EF) = Pr(X_1 = 6, X_2 = 5, X_3 = 4)$$
$$= Pr(X_1 = 6).Pr(X_2 = 5).Pr(X_3 = 4)$$
$$= \frac{1}{6}.\frac{1}{6}.\frac{1}{6}$$
$$= \frac{1}{216}$$

(2.0.3)

Probability P(E|F) ,

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