Assignment 1

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Download all python codes from

https://github.com/sujal100/Probability_and_Random_variable/tree/main/exercise_1/codes

and latex codes from

https://github.com/https://github.com/sujal100/Probability_and_Random_variable/blob/main/exercise_1/exercise_1_main_tex.tex

1 Problem

A die is thrown. If E is the event "the number appearing is a multiple of 3" and F be the event "the number appearing is even" then find whether E and F are independent ?

2 Solution

Two event A and B are independent if

$$P(A \cap B) = P(A) \cdot P(B) \tag{2.0.1}$$

A die is thrown.
We know that the sample space is

$$\mathbf{S} = (1, 2, 3, 4, 5, 6) \tag{2.0.2}$$

Let two events be
A: the number appear is a multiple of 3 .
B: the number appearing is even.

$$\text{A} : (3, 6) \tag{2.0.3}$$

$$\mathbf{Pr(A)} = \frac{2}{6} = \frac{1}{3} \tag{2.0.4}$$

$$\text{B} : (2, 4, 6) \tag{2.0.5}$$

$$\mathbf{Pr(B)} = \frac{3}{6} = \frac{1}{2} \tag{2.0.6}$$

(2.0.7)

$A \cap B$ =the number appearing is even multiple of 3 = (3)
So,

$$\mathbf{Pr(A \cap B)} = \frac{1}{6} \tag{2.0.8}$$

Now,

$$\mathbf{Pr(A)} \cdot \mathbf{Pr(B)} = \frac{1}{3} \cdot \frac{1}{2} = \frac{1}{6} \tag{2.0.9}$$

Since,

$$\mathbf{Pr(A \cap B)} = \mathbf{Pr(A)} \cdot \mathbf{Pr(B)} \tag{2.0.10}$$

Therefore A and B are independent events.