10.3.6.1.7

EE24BTECH11027 - G.V.Satwika

Problem statement I

Find the PMF of the event - a multiple of 3, when a die is thrown.

Solution:

Theoretical solution:

- We define a random variable X as X : outcome of the die when thrown, is a multiple of 3.
- The possible outcomes of a die when thrown are $\{1, 2, 3, 4, 5, 6\}$. From these, the multiples of 3 are 3 and 6.
- Therefore X can take the values of 3 and 6. So, the probability space for X is $\{3, 6\}$ and the outcomes are equally likely.

So, the *PMF* of X is

$$P(X = x) = \begin{cases} \frac{1}{2}, & x = 3, 6 \\ 0, & \text{otherwise} \end{cases} \tag{1}$$

Simulation:

Problem statement II

- We can simulate this event by rolling a die multiple times and keeping only the outcomes which are multiples of 3.
- We count the number of 3 and 6 and normalize them.
- The more number of rolls gives the more accuracy in simulation.

The below graph shows the comparison between both the simulation and theoretical probabilities.

Plot:

Problem statement III