

# Assignment 3

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Download all python codes from

<https://github.com/Ananthoju-Pranav-Sai/AI1103/tree/main/Assignment%203/Codes>

and latex codes from

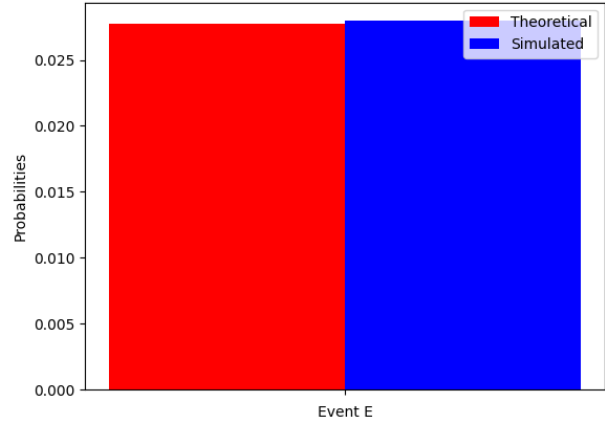
<https://github.com/Ananthoju-Pranav-Sai/AI1103/blob/main/Assignment%203/main.tex>

$$\Rightarrow \Pr(E) = \sum_{i=1}^6 \frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} \quad (4.5)$$

$$\Rightarrow \Pr(E) = \frac{6}{216} \quad (4.6)$$

$$\Rightarrow \Pr(E) = 0.0277 \quad (4.7)$$

**Theoretical v/s Simulated probabilities :**



## GATE-PROBLEM 4

Three fair cubical dice are throen simultaneously. The probability that all three dice have the same number of dots on the faces showing up is (up to third decimal place).

### SOLUTION

Let  $X_i \in \{1,2,3,4,5,6\}$ ,  $i=\{1,2,3\}$  be the random variables representing the outcome for each die. As the dice are fair the probability mass function (pmf) is expressed as

$$p_{X_i}(n) = \Pr(X_i = n) = \begin{cases} \frac{1}{6} & 1 \leq n \leq 6 \\ 0 & \text{otherwise} \end{cases} \quad (4.1)$$

Let E be the event “All the three dice have the same number of dots on the face showing”.

$$\Pr(E) = \sum_{i=1}^6 \Pr(X_1 = i, X_2 = i, X_3 = i) \quad (4.2)$$

As the events  $X_1 = i, X_2 = i$  and  $X_3 = i$  are independent we have

$$\Pr(X_1 = i, X_2 = i, X_3 = i) = p_{X_1}(i) \cdot p_{X_2}(i) \cdot p_{X_3}(i) \quad (4.3)$$

$$\therefore \Pr(E) = \sum_{i=1}^6 p_{X_1}(i) \cdot p_{X_2}(i) \cdot p_{X_3}(i) \quad (4.4)$$