Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Techonology Hyderabad

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Question 13.2.12:

Problem Statement

A die is tossed thrice. Find the probability of getting an odd number at least once.

Solution

Let X be a random variable defined as the number of odd number occurrences in three trials.

$$\therefore X = \{0, 1, 2, 3\} \tag{1}$$

Required values of X are;

$$X = \{1, 2, 3\} \tag{2}$$

Probability of an observation being odd is;

$$p = \frac{3}{6} = \frac{1}{2} \tag{3}$$

Let $F_X(i)$ be the **Cumulative distribution function**(CDF) such that;

$$F_X(i) = \Pr(X \le i) \tag{4}$$

$$\Pr(X = i) =^n C_i \times p^i \times (1-p)^{(n-i)} \tag{5}$$

$$where\ n = 3\ and\ i \in \{0, 1, 2, 3\} \tag{6}$$

Required probability is equivalent to;

$$\Pr(X = i \mid 1 \ge i \ge 3) = F_X(3) - F_X(0) \tag{7}$$

$$= \sum_{i=1}^{3} \Pr(X = i) \tag{8}$$

$$\therefore \Pr(At\ least\ one\ odd) = \frac{7}{8} \tag{9}$$

Python code: [1]

References

[1] https://github.com/Gunethra/AI1110_2023/tree/master/code.

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