Assignment 1

AI1110: Probability and Random Variables
Indian Institute of Techonology Hyderabad

Gunethra Bommineni*

Question 13.2.12:

Problem Statement

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

Solution

Given:
We are given that the die is tossed thrice.

Need to find:
Probability of getting an odd number at least once in the three trials.

Solving steps:
The sample space for the experiment is;

$$S = \{1, 2, 3, 4, 5, 6\} \tag{1}$$

Required probability of at least one odd observation is equivalent to the probability of non occurrence for all observations being even.

Let

$$P(A) = \textit{Probability of all observations being even} \tag{2}$$

and

$$P(B) = \textit{Probability of atleast one observation being odd} \tag{3}$$

$$\implies P(B) = 1 - P(A) \tag{4}$$

Possible even observations are;

$$S_{even} = \{2, 4, 6\} \tag{5}$$

Probability of an observation being even is;

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

Probability of all three observation being even is;

$$P(A) = \frac{1}{2} * \frac{1}{2} * \frac{1}{2} = \frac{1}{8} \tag{7}$$

Therefore, probability of at least one odd observation is;

$$P(B) = 1 - P(A) = 1 - \frac{1}{8} = \frac{7}{8} \tag{8}$$

Conclusion

The probability of getting an odd number at least once is 0.875 as also calculated using the python code. [1]

*The student is with the Department of Electrical Engineering, Indian Institute of Technology, Hyderabad 502285 India e-mail: ee22btech11205@iith.ac.in.

References

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