Assignment 4

Varenya Upadhyaya EP20BTECH11026

Download all python codes from

https://github.com/varenya27/AI1103/tree/main/Assignment4/codes

and latex-tikz codes from

https://github.com/varenya27/AI1103/tree/main/Assignment4/main.tex

Problem

A fair dice is rolled twice. The probability that an odd number will follow an even number is

(a) $\frac{1}{2}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

Solution

The number on the face of a fair die can be either odd or even, let a random variable $X \in \{0, 1\}$ denote the possible outcomes of the event of rolling a die.

Dice output	X	Number
Even number	0	$n(X = 0) = 3$
Odd number	1	$n(X = 1) = 3$

TABLE 4: Outcome of the Experiment

The probability of getting an even number can then be calculated as,

$$\Pr(X = 0) = \frac{n(X = 0)}{n(X = 0) + n(X = 1)} = \frac{3}{6} \tag{0.0.1}$$

$$= \frac{1}{2} \tag{0.0.2}$$

Similarly,

$$\Pr(X = 1) = \frac{1}{2} \tag{0.0.3}$$

In the experiment, the die is rolled twice. Let E denote the event of getting an even number in the first throw and then an odd number in the second. The probability of this happening can be calculated as:

$$\Pr(E) = \Pr(X = 0) \times \Pr(X = 1) \tag{0.0.4}$$

$$= \frac{1}{2} \times \frac{1}{2} \tag{0.0.5}$$

$$= \frac{1}{4} \tag{0.0.6}$$

The required probability is $\frac{1}{4}$; option (d) is correct.