Assignment 4

Akyam L Dhatri Nanda - AI20BTECH11002

Download all python codes from

https://github.com/Dhatri-nanda/AS4/blob/main/Assignment4/code.py

and latex-tikz codes from

https://github.com/Dhatri-nanda/AS4/blob/main/Assignment4/Assignment4.tex

1 Problem

A box has ten light bulbs out of which two are defective, Two light bulbs are drawn from this box one after the other without replacement. The probability that both light bulbs drawn are not defective is

A) $\frac{8}{45}$ B) $\frac{28}{45}$ C) $\frac{16}{25}$ D) $\frac{4}{5}$

2 Solution

Let $X_i \in \{0, 1\}$ represent the i^{th} draw, where 0 denotes a defective bulb and 1 denotes a non-defective bulb.

TABLE 4

	$X_1 = 0$	$X_1 = 1$
$X_2 = 0$	2/90	16/90
$X_2 = 1$	16/90	56/90

Table 4 represents the probabilities of all possible cases when two bulbs are drawn one by one without replacement.
Probability that both of the bulbs are non-defective (by substituting values from table 4)

$$= \Pr(X_2 = 1 | X_1 = 1) \Pr(X_1 = 1) \tag{2.0.1}$$

$$= \frac{56}{90} \tag{2.0.2}$$

$$= \frac{28}{45} \tag{2.0.3}$$

So the correct option is (B)

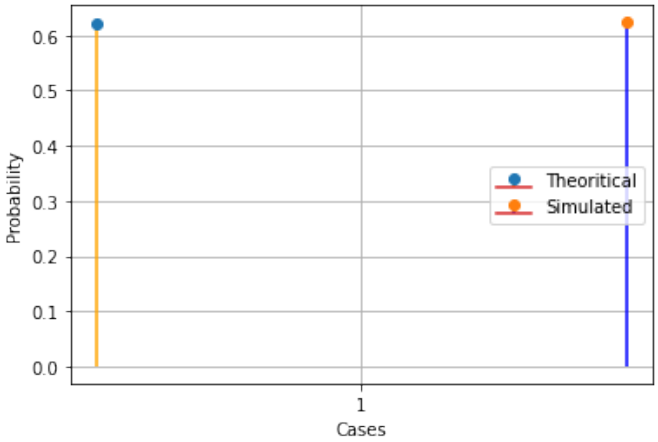

Fig. 4: Simulation and Theoretical Comparison