Assignment 3

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Download all python codes from

https://github.com/Dhatri-nanda/AS3/blob/main/Assignment3/code.py

and latex-tikz codes from

https://github.com/Dhatri-nanda/AS3/blob/main/Assignment3/Assignment3.tex

1 Problem

There are 3 red socks, 4 green socks and 3 blue socks. You choose two socks. The probability that they are of the same color is

A) $\frac{1}{5}$ B) $\frac{7}{30}$ C) $\frac{1}{4}$ D) $\frac{4}{15}$

2 Solution

Let $X_i \in \{1, 2, 3\}$ represent the i^{th} draw, where 1, 2, 3 correspond to the colour of socks drawn as Red, Blue and Green respectively

TABLE 4

	$X_1 = 1$	$X_1 = 2$	$X_1 = 3$
$X_2 = 1$	6/90	12/90	9/90
$X_2 = 2$	12/90	12/90	12/90
$X_2 = 3$	9/90	12/90	6/90

TABLE 4 represents all the possibilities of choosing socks one by one.
The probability that the two socks drawn are of the same colour(by substituting values from table 4)

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

$$= \sum_{i=1}^{3} \Pr(X_2 = i | X_1 = i) \Pr(X_1 = i) \tag{2.0.2}$$

$$= \frac{6}{90} + \frac{12}{90} + \frac{6}{90} \tag{2.0.3}$$

$$= \frac{4}{15} \tag{2.0.4}$$

So the correct option is (D)

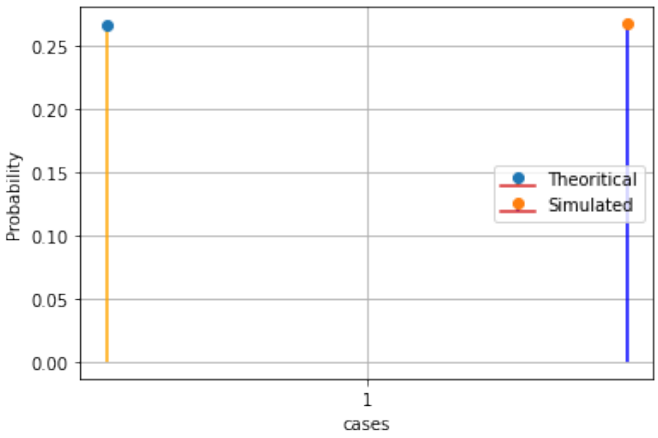

Fig. 4: Simulation and Theoretical Comparison