

# ASSIGNMENT 8

MANIKANTA VALLEPU - AI20BTECH11014

Download all python codes from

[https://github.com/manik2255/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT\\_8/assign\\_8.py](https://github.com/manik2255/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT_8/assign_8.py)

and latex-tikz codes from

[https://github.com/manik2255/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT\\_8/ASSIGNMENT\\_8.tex](https://github.com/manik2255/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT_8/ASSIGNMENT_8.tex)

## 1 GATE 2021 ST PROBLEM.14

Four red balls, four green balls and four blue balls are put in a box. Three balls are pulled out of the box at random one after another without replacement. The probability that all the three balls are red is

## 2 SOLUTION

Let  $A, B, C \in \{0, 1\}$ , where 0 denotes that pulled out ball is red, and 1 denotes that pulled out ball is not red.  $A$  denotes the first ball is pulled out of the box,  $B$  denotes the second ball is pulled out of the box,  $C$  denotes the third ball is pulled out of the box.

$$\Pr(A = 0) = \frac{4}{12} \quad (2.0.1)$$

$$\Pr(B = 0|A = 0) = \frac{3}{11} \quad (2.0.2)$$

$$\Pr(C = 0|(B = 0, A = 0)) = \frac{2}{10} \quad (2.0.3)$$

Applying Bayes Theorem to  $\Pr(A = 0, B = 0)$ ,

$$\Pr(A = 0, B = 0) = \Pr(B = 0|A = 0) \Pr(A = 0) \quad (2.0.4)$$

using (2.0.1) and (2.0.2) ,

$$= \frac{3}{11} \cdot \frac{4}{12} \quad (2.0.5)$$

$$= \frac{1}{11} \quad (2.0.6)$$

similarly  $\Pr(A = 0, B = 0, C = 0)$  can be written as,

$$= \Pr(C = 0|(B = 0, A = 0)) \Pr(A = 0, B = 0) \quad (2.0.7)$$

using (2.0.3) and (2.0.6) ,

$$= \frac{2}{10} \cdot \frac{1}{11} \quad (2.0.8)$$

$$= \frac{1}{55} \quad (2.0.9)$$

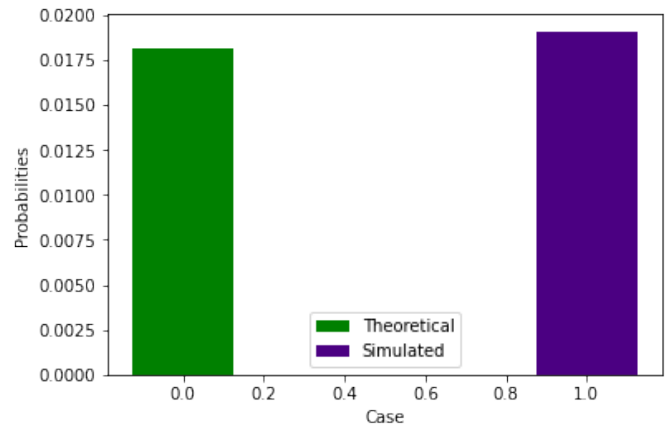


Fig. 1: Theoretical vs simulation