Assignment-2

Name: Sai Pravallika Danda, Roll Number: CS20BTECH11013

Download all python codes from

https://github.com/spdanda/AI1103/tree/main/Assignment2/codes

and latex-tikz codes from

https://github.com/spdanda/AI1103/blob/main/Assignment2/Assignment2.tex

Problem 5.31 :

Two cards are drawn simultaneously (or successively without replacement) from a well-shuffled pack of 52 cards. Find the mean, variance and standard deviation of the number of kings.

Solution :

Let X denote the no.of kings in a draw of 2 cards.

$$\implies \Pr(X=0) = \frac{48_{C_2}}{52_{C_2}} = \frac{188}{221} \quad (0.0.1)$$

$$\Pr(X=1) = \frac{4_{C_1} \times 48_{C_1}}{52_{C_2}} = \frac{32}{221} \quad (0.0.2)$$

$$\Pr(X=2) = \frac{4_{C_2}}{52_{C_2}} = \frac{1}{221} \quad (0.0.3)$$

X	0	1	2
$\Pr(X)$	$\frac{188}{221}$	$\frac{32}{221}$	$\frac{1}{221}$

TABLE 0: Probability distribution table

$$\text{Mean of } X = E(X) = \sum_{k=0}^{2} k \Pr(X=k) = 1 \times \frac{32}{221} + 2 \times \frac{1}{221} = \frac{34}{221} = 0.154 \quad (0.0.4)$$

$$\text{Variance} = E(X^2) - [E(X)]^2 = \sum_{k=0}^{2} k^2 \Pr(X=k) - \frac{34^2}{221^2} = 1^2 \times \frac{32}{221} + 2^2 \times \frac{1}{221} - \frac{34^2}{221^2} = \frac{6800}{48841} = 0.139 \quad (0.0.5)$$

$$\text{Standard Deviation } \sigma = \sqrt{Var(X)} = \sqrt{0.139} = 0.373 \quad (0.0.6)$$

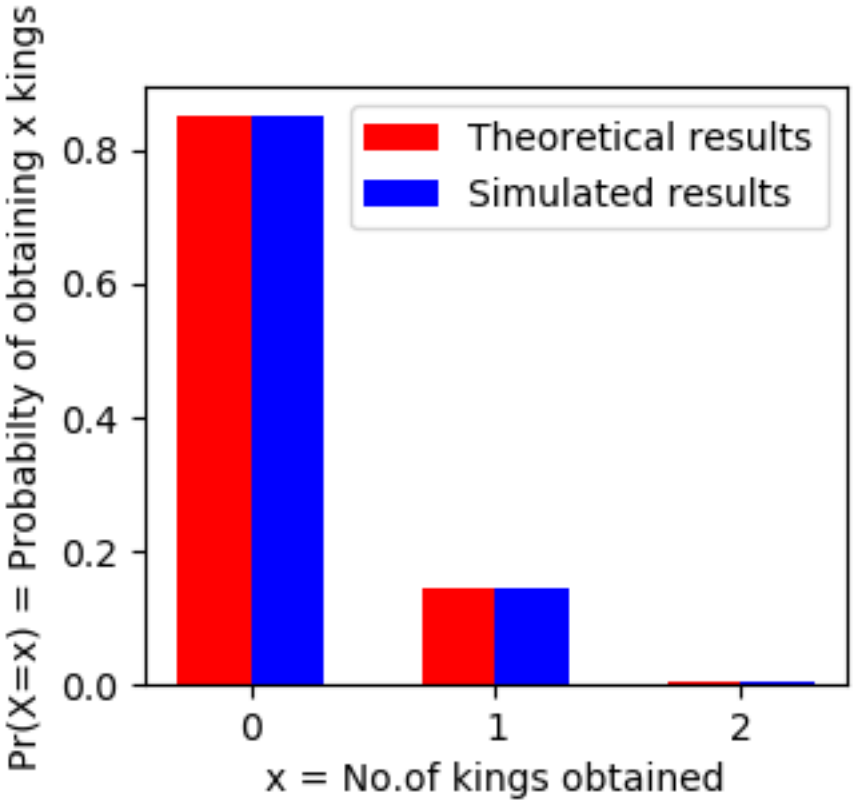

Fig. 0: Theoretical and Simulated probability results