

Assignment 3

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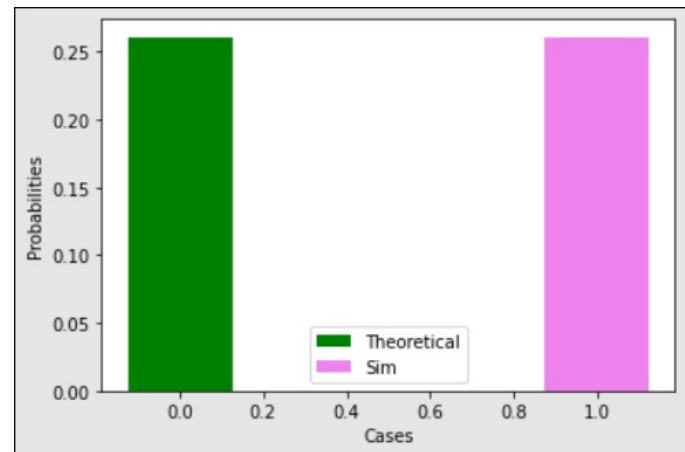
Download all python codes from

<https://github.com/Dontha-Aarthi/AI1103/tree/main/Assignment3/Codes>

and latex-tikz codes from

<https://github.com/Dontha-Aarthi/AI1103/blob/main/Assignment3/main.tex>

The graph for theoretical result vs simulation is given below



1 PROBLEM

(GATE 2019-XE Q.no 1 (Page Number:4))

Let X be the Poisson random variable with parameter $\lambda = 1$. Then, the probability $\Pr(2 \leq X \leq 4)$ equals

2 SOLUTION

Let

$$X \in \{0, 1, 2, 3, 4, 5, \dots\} \quad (2.0.1)$$

We know that, for a poisson random variable X with a given parameter λ , probability of $X = k$ is:

$$\Pr(X = k) = \left(\frac{\lambda^k e^{-\lambda}}{k!} \right) \quad (2.0.2)$$

We have to find the value of $\Pr(2 \leq X \leq 4)$ and given that $\lambda=1$. So,

$$\Pr(2 \leq X \leq 4) =$$

$$\Pr(X = 2) + \Pr(X = 3) + \Pr(X = 4) \quad (2.0.3)$$

$$\begin{aligned} \Pr(2 \leq X \leq 4) &= \left(\frac{\lambda^2 e^{-\lambda}}{2!} \right) + \left(\frac{\lambda^3 e^{-\lambda}}{3!} \right) + \left(\frac{\lambda^4 e^{-\lambda}}{4!} \right) \\ &= \left(\frac{e^{-1}}{2!} \right) + \left(\frac{e^{-1}}{3!} \right) + \left(\frac{e^{-1}}{4!} \right) \\ &= \frac{e^{-1}}{2} + \frac{e^{-1}}{6} + \frac{e^{-1}}{24} \\ &= \frac{17}{24e} \end{aligned} \quad (2.0.4)$$