Assignment 6- Probability and Random Variables

Songa Kotesh Satvik

Download all python codes from

```
https://github.com/KoteshSatvik/AI1103-Probability_and_Random_Variables/tree/main/Assignment-6/codes
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and latex-tikz codes from

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https://github.com/KoteshSatvik/AI1103-Probability_and_Random_Variables/blob/main/Assignment-6/Assignment6.tex
```

1 Problem : Gate-2014(me-set4)–Q.28(me-section)

The number of accidents occurring in a plant in a month follows Poisson distribution with mean as 5.2. The probability of occurrence of less than 2 accidents in the plant during a randomly selected month is

2 Solution

Let X be the Poisson random variable representing number of accidents occurrig in a plant in a month with mean 5.2
Then We know that ,

$$\text{Parameter of X, } \lambda = E(X) \tag{2.0.1}$$
$$\therefore \lambda = 5.2 \tag{2.0.2}$$

For any k $\in \{0, 1, 2, 3, 4, ...\}$ Poisson probability mass function is,

$$\Pr(X = k) = \frac{e^{-\lambda}\lambda^k}{k!} \tag{2.0.3}$$

Then the Poisson cumulative distributive function is,

$$F(X = k) = \sum_{i=0}^{k}\left(\frac{e^{-\lambda}\lambda^k}{k!}\right) \tag{2.0.4}$$

The probability of occurence of less than 2 accidents in a month,

$$\text{Req. Probability} = \Pr(X < 2) \tag{2.0.5}$$
$$= \Pr(X \leq 1) \tag{2.0.6}$$
$$= F(1) \tag{2.0.7}$$
$$= \sum_{i=0}^{1}\left(\frac{e^{-\lambda}\lambda^k}{k!}\right) \tag{2.0.8}$$
$$= e^{-\lambda}\left[\frac{\lambda^0}{1} + \frac{\lambda^1}{1}\right] \tag{2.0.9}$$
$$= e^{-\lambda}[1 + \lambda] \tag{2.0.10}$$
$$= (0.0055)(6.2) \tag{2.0.11}$$
$$\therefore \Pr(X < 2) = 0.034 \tag{2.0.12}$$

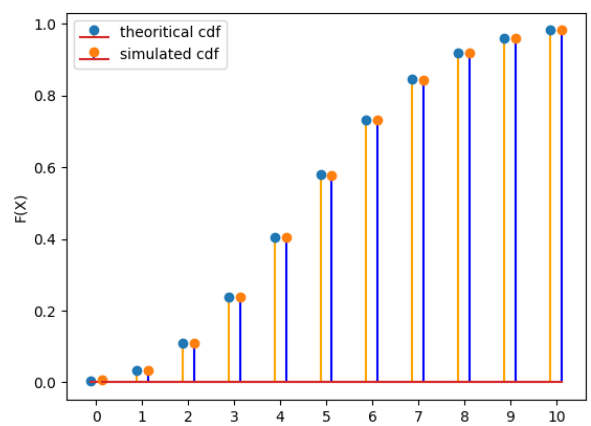

Fig. 0: Theoretical and simulated CDF