AI1103 : Assignment 5

Santosh Dhaladhuli MS20BTECH11007

Download all python codes from

```
https://github.com/Santosh-Dhaladhuli2003/
    AI1103/blob/main/Assignment%205/
    assignment_5.py
```

and latex codes from

```
https://github.com/Santosh-Dhaladhuli2003/
    AI1103/blob/main/Assignment%205/
    Assignment%205.tex
```

1 GATE IN 2007 Question No. 27

Assume that the duration in minutes of a telephone conversation follows the exponential distribution f(x) = $\frac{1}{5}e^{-\frac{x}{5}}$, x $\geq$ 0. The probability that the conversation will exceed five minutes is...

1) $\frac{1}{e}$
2) 1 - $\frac{1}{e}$
3) $\frac{1}{e^2}$
4) 1 - $\frac{1}{e^2}$

2 Solution

Let X be a Random variable defined,that denotes the duration of a telephonic conversation in minutes. So, X $\in$ [0,∞)
Using the probability in exponential distribution,

$$\Pr(X > 5) = \lim_{x\to\infty} \int_5^x \frac{1}{5}e^{-\frac{x}{5}}\,dx \tag{2.0.1}$$

$$\implies \lim_{x\to\infty} \left(-e^{-\frac{x}{5}}\right)\Big|_5^x \tag{2.0.2}$$

$$\implies \lim_{x\to\infty} \left(-e^{-\frac{x}{5}} + \frac{1}{e}\right) \tag{2.0.3}$$

$$\therefore \Pr(X > 5) = \frac{1}{e} \tag{2.0.4}$$