1

AI 1103 - Assignment 5

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Download all python codes from

https://github.com/rohanthota/Assignment_5/codes /Assignment_5.py

and latex codes from

https://github.com/rohanthota/Assignment_5/ Assignment 5.tex

Question

A continuous random variable X has a probability density function $f(x) = e^{-x}$ where, $0 < x < \infty$. Then Pr(X > 1) = is?

Solution

Here, x is a uniform variable with $0 < x < \infty$. which tells us $f(x) = e^{-x}$ is also uniform, with 0 < f(x) < 1.

Let, F(x) be the cumulative distribution function of the random variable X.

$$F(x) = \Pr(X \le x) = \int_0^x f(x) dx = \int_0^x e^{-x} dx$$

$$= \left[-e^{-x} \right]_0^x = \left(-e^{-x} \right) - \left(-e^0 \right) = 1 - e^{-x} \quad (0.0.2)$$

Now,
$$Pr(X > 1) = 1 - Pr(X \le 1)$$
 (0.0.3)

$$\Pr(X \le 1) = 1 - e^{-1} \tag{0.0.4}$$

$$Pr(X > 1) = e^{-1} = 0.368$$
 (0.0.5)

