

# AI 1103 - Assignment 5

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Download all python codes from

[https://github.com/rohanthota/Assignment\\_5/codes/Assignment\\_5.py](https://github.com/rohanthota/Assignment_5/codes/Assignment_5.py)

and latex codes from

[https://github.com/rohanthota/Assignment\\_5/Assignment\\_5.tex](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

$x$  is uniform, with  $0 < x < \infty$ .

$f(x) = e^{-x}$  is uniform, with  $0 < f(x) < 1$ .

Let,  $F_X(x)$  be the cumulative distribution function of  $X$ .

$$F_X(x) = \Pr(X \leq x) = \int_0^x f(x) dx = \int_0^x e^{-x} dx \quad (0.0.1)$$

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

$$\Pr(X > 1) = F_X(\infty) - F_X(1) \quad (0.0.3)$$

$$= 1 - e^{-\infty} - (1 - e^{-1}) = 0.368 \quad (0.0.4)$$

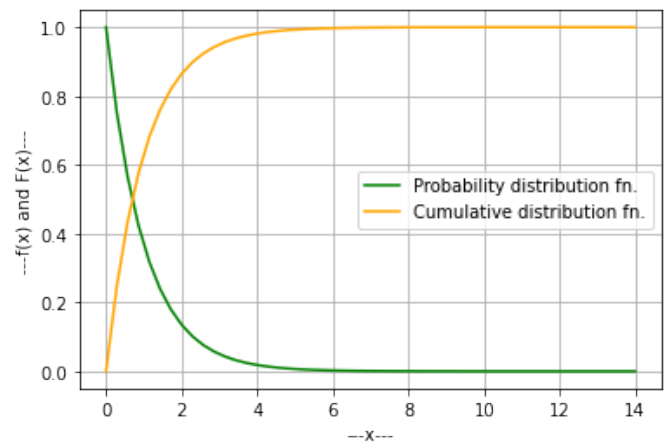


Fig. 0: Plotting probability distribution and cumulative distribution functions.