#### 1

# Assignment-2

## Sushma - CS20BTECH11051

# Download all python codes from

https://github.com/Sushma-AI1103/AI1103-Assingment-2/blob/main/assingment\_2.py

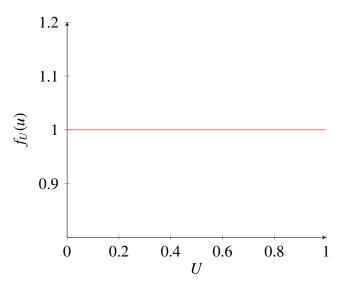
### 1 Problem

79-Suppose the random variable U has uniform distribution on [0,1] and  $X = -2\ln(U)$  .Find the density of X .

### 2 Solutions:

U - uniformly distributed random variable on  $\in$  [0,1].

Probability density function of U is:



X is given by :

$$X = -2\ln(U)$$
 (2.0.1)

$$\implies 0 \le X \le \infty$$
 (2.0.2)

CDF of X is defined as

$$F_X(x) = Pr(X \le x) \tag{2.0.3}$$

$$= Pr(-2\ln(U) \le x)$$
 (2.0.4)

$$= Pr(\ln(U) \ge (-x)/2) \tag{2.0.5}$$

$$= Pr(U \ge \exp(-x/2)) \tag{2.0.6}$$

$$= 1 - Pr(U \le exp(-x/2)) \tag{2.0.7}$$

$$= 1 - exp(-x/2) \tag{2.0.8}$$

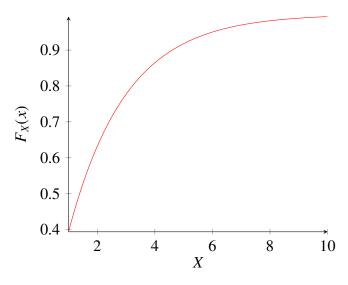
PDF of X:

$$f_X(x) = \frac{d(F_X(x))}{dx} \tag{2.0.9}$$

$$= \frac{1}{2} exp((-x)/2) \tag{2.0.10}$$

$$\implies f_X(x) = \begin{cases} \frac{1}{2} exp((-x)/2) & x > 0\\ 0 & otherwise \end{cases}$$
 (2.0.11)

Plot CDF of X:



PDF of X -

