Assignment-2

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Download all python codes from

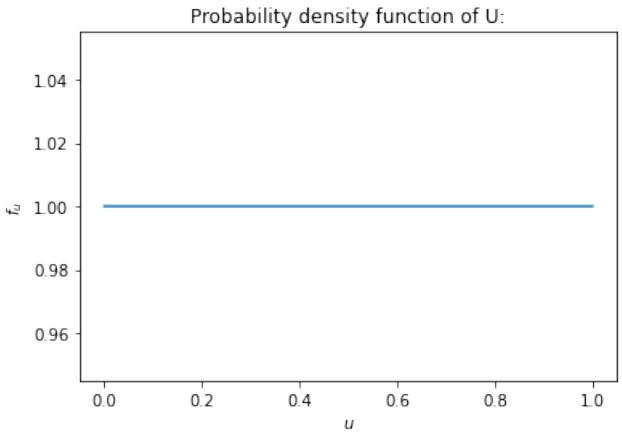
https://github.com/Sushma−AI1103/AI1103−Assingment−2/blob/main/assingment_2.py

1 Problem

79-Suppose the random variable U has uniform distribution on [0,1] and X = -2ln(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 :

$$X = -2\ln(U) \tag{2.0.1}$$
$$\implies 0 \le X \le \infty \tag{2.0.2}$$

CDF of X is defined as

$$F_X(x) = Pr(X \le x) \tag{2.0.3}$$
$$= Pr(-2\ln(U) \le x) \tag{2.0.4}$$
$$= Pr(\ln(U) \ge (-x)/2) \tag{2.0.5}$$
$$= Pr(U \ge \exp(-x/2)) \tag{2.0.6}$$
$$= 1 - Pr(U \le exp(-x/2) \tag{2.0.7}$$
$$= 1 - exp(-x/2) \tag{2.0.8}$$

PDF of X :

$$f_X(x) = \frac{d(F_X(x))}{dx} \tag{2.0.9}$$
$$= \frac{1}{2}exp((-x)/2) \tag{2.0.10}$$

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