

AI1103 : Assignment 2

Javaji Manoj Bhargav - CS20BTECH11022

Download all python codes from

<https://github.com/Manojbhargav1305/AI1103/tree/main/Assignment1/codes>

and latex codes from

<https://github.com/Manojbhargav1305/AI1103/blob/main/Assignment1/Assignment1.tex>

GATE-EC Q.50

Q) The probability density function(PDF) of a random variable X is as shown in the fig. The corresponding cumulative distribution function (CDF) has the form

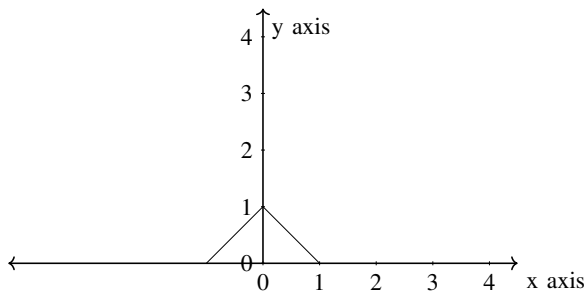


Fig. 0: PDF Graph

SOLUTION

The given PDF graph can be represented by the function $f(x)$.

$$f(x) = \begin{cases} 0 & |x| > 1 \\ 1 - |x| & |x| \leq 1 \end{cases} \quad (0.0.1)$$

Now, we need to find the corresponding CDF graph for $f(x)$. Let the CDF be represented by $F(x)$. We know that

$$F(x) = \int_{-\infty}^x f(x) dx \quad (0.0.2)$$

$$\text{for } x \in [-1, 0] : F(x) = \int_{-1}^x (1 + x) dx = x + \frac{x^2}{2} + \frac{1}{2} \quad (0.0.3)$$

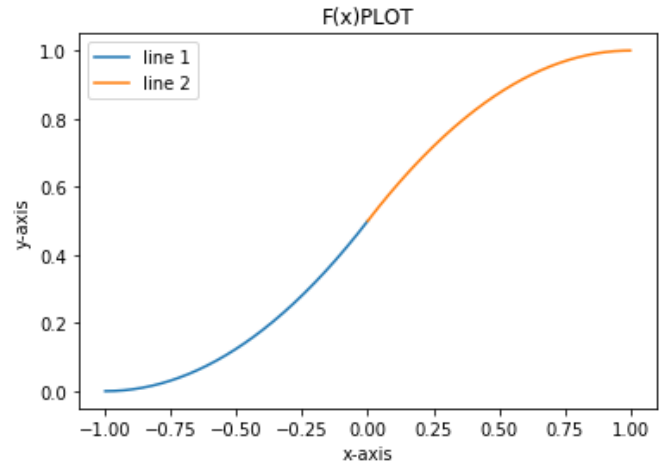


Fig. 0: CDF graph

$$\text{for } x \in (0, 1]; F(x) = \int_0^x (1 - x) dx = x - \frac{x^2}{2} + \frac{1}{2} \quad (0.0.4)$$

from the equation we get

$$F(x) = \begin{cases} 0 & |x| > 1 \\ \frac{x^2}{2} + x + \frac{1}{2} & -1 \leq x < 0 \\ -\frac{x^2}{2} + x + \frac{1}{2} & 0 \leq x < 1 \end{cases} \quad (0.0.5)$$

Therefore the graph for the corresponding CDF is shown in the figure