AI1103 : Assignment 2

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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

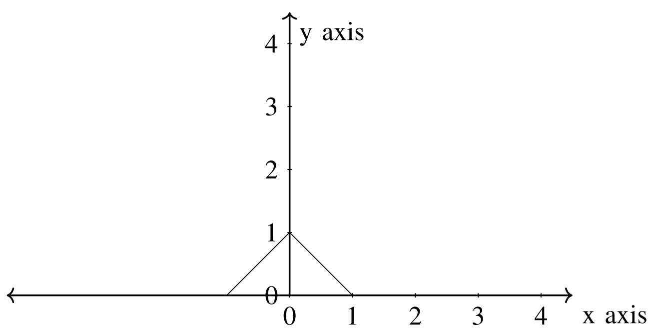

Fig. 0: PDF Graph

Solution

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

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

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

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

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

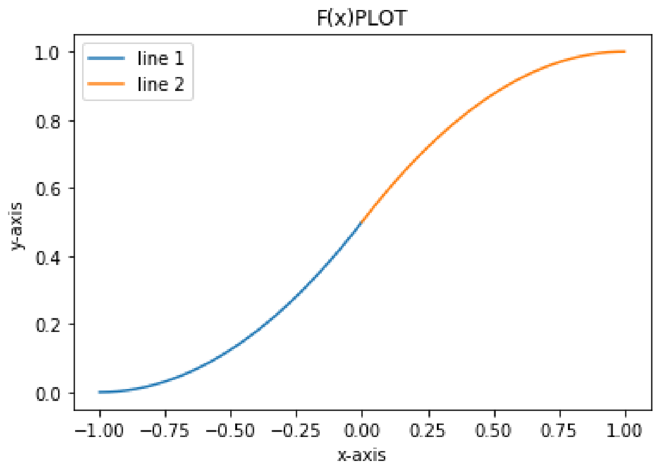

Fig. 0: CDF graph

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

from the equation we get

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

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