

Assignment 5

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Download all python codes from

https://github.com/Ananthoju-Pranav-Sai/AI1103/tree/main/Assignment_5/Codes

and latex codes from

https://github.com/Ananthoju-Pranav-Sai/AI1103/blob/main/Assignment_5/main.tex

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Let the cumulative distribution function of the random variable X be given by

$$F_X(x) = \begin{cases} 0 & x < 0 \\ x & 0 \leq x < 1/2 \\ (1+x)/2 & 1/2 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$$

Then $\Pr(X = 1/2) = ?$

SOLUTION

Given,

$$F_X(x) = \begin{cases} 0 & x < 0 \\ x & 0 \leq x < 1/2 \\ \frac{(1+x)}{2} & 1/2 \leq x < 1 \\ 1 & x \geq 1 \end{cases} \quad (24.1)$$

$$\Pr(X = 1/2) = \Pr(X \leq 1/2) - \Pr(X < 1/2) \quad (24.2)$$

$$\Rightarrow \Pr(X = 1/2) = F_X\left(\frac{1}{2}\right) - F_X\left(\frac{1}{2}^-\right) \quad (24.3)$$

(0.0.1)

Using (24.1) in (24.2),

$$\Rightarrow \Pr(X = 1/2) = \frac{(1 + 1/2)}{2} - (1/2) \quad (24.4)$$

$$\Rightarrow \Pr(X = 1/2) = (3/4) - (1/2) \quad (24.5)$$

$$\therefore \Pr(X = 1/2) = 1/4 \quad (24.5)$$

The cdf plot of random variable X is as shown in Fig. 0

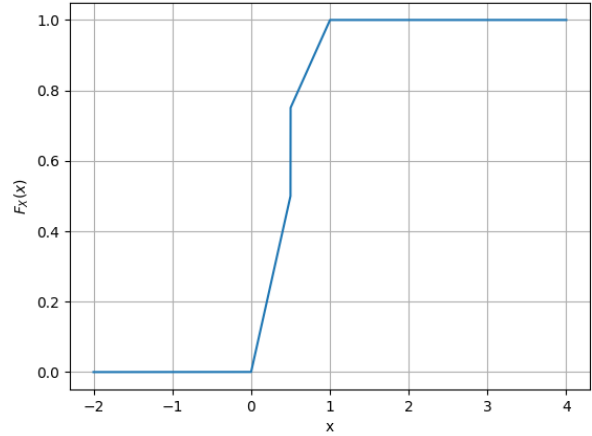


Fig. 0: cdf plot of random variable X