AI1103-Assignment 4

W Vaishnavi
AI20BTECH11025

Download all python codes from

https://github.com/vaishnavi−w/AI1103/blob/main/Assignment4/code4.py

and latex-tikz codes from

https://github.com/vaishnavi−w/AI1103/blob/main/Assignment4/latex4.tex

Question

Let $\Omega = (0, 1]$ be the sample space and let $P(.)$ be a probability distribution given by

$$\mathrm{P}((0, x]) = \begin{cases} \frac{x}{2} & 0 \le x < \frac{1}{2} \\ x & \frac{1}{2} \le x \le 1 \end{cases}$$

Find $P\left(\frac{1}{2}\right)$

Solution

CDF of X is defined as,

$$F_X(x) = \Pr(X \le x) \tag{0.0.1}$$

$\because x > 0$

$$F_X(x) = P((0, x]) \tag{0.0.2}$$

Thus, CDF of X is given by

$$F_X(x) = \begin{cases} 0 & x < 0 \\ \frac{x}{2} & 0 \le x < \frac{1}{2} \\ x & \frac{1}{2} \le x \le 1 \\ 1 & x \ge 1 \end{cases} \tag{0.0.3}$$

$$\Pr\left(\frac{1}{2}\right) = F\left(\frac{1}{2}\right) - F\left(\frac{1}{2}^{-}\right) \tag{0.0.4}$$

$$= \frac{1}{2} - \frac{1/2}{2} \tag{0.0.5}$$

$$= \frac{1}{4} \tag{0.0.6}$$

The plot of CDF is given in the Figure 0

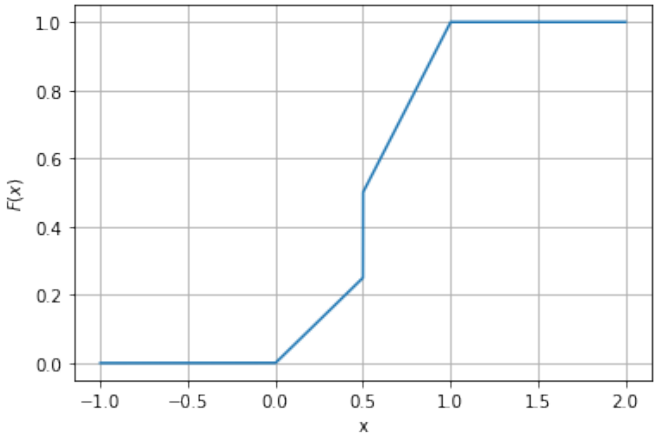

Fig. 0: CDF of X