Assignment 2

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Download all python codes from

https://github.com/SAHIL150602/AI1103/blob/main/Assignment2/codes/Assignment2.py
https://github.com/SAHIL150602/AI1103/blob/main/Assignment2/codes/Assignment2_figure.py

and latex-tikz codes from

https://github.com/SAHIL150602/AI1103/blob/main/Assignment2/Assignment2.tex

1 Problem

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

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

Then $P(\{\frac{1}{2}\}) =$

2 Solution

Given that, the CDF of the given random variable is

$$F_X(x) = \begin{cases} x/2, & 0 < x < \frac{1}{2} \\ x, & \frac{1}{2} \le x \le 1 \end{cases}$$

that means probability of the random variable being m is

$$\Pr(X = m) = F_X(m) - \lim_{t \to m^-} F_X(t) \tag{1}$$

Hence the probability value at $X = \frac{1}{2}$ is

$$\Pr(X = 1/2) = F_X(\frac{1}{2}) - \lim_{t \to \frac{1}{2}^-} F_X(t) \tag{2}$$

$$= \frac{1}{2} - \lim_{x \to \frac{1}{2}^-} \frac{x}{2} \tag{3}$$

$$= \frac{1}{2} - \frac{1}{4} \tag{4}$$

$$= \frac{1}{4} = 0.25 \tag{5}$$