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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

GATE EC Q.61

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

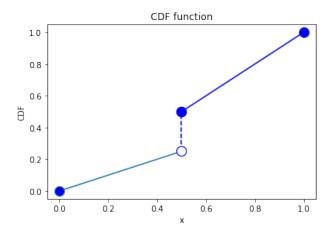
$$P((0,x]) = \begin{cases} x/2, & 0 < x < 1/2 \\ x, & 1/2 \le x \le 1 \end{cases}$$

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

$$Pr(X = m) = F_X(m) - \lim_{t \to m^-} F_X(t)$$
 (2.0.1)

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

$$\Pr(X = 1/2) = F_X \left(\frac{1}{2}\right) - \lim_{t \to \frac{1}{2}^-} F_X(t) \tag{2.0.2}$$

$$= \frac{1}{2} - \lim_{x \to \frac{1}{2}^{-}} \frac{x}{2} \tag{2.0.3}$$

$$=\frac{1}{2}-\frac{1}{4}\tag{2.0.4}$$

$$=\frac{1}{4}=0.25\tag{2.0.5}$$