

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 $P(\cdot)$ be a probability function defined by

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

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

2 SOLUTION

Given that, the CDF of the given random variable is

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

that means probability of the random variable being m is

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

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

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

$$= \frac{1}{2} - \lim_{x \rightarrow \frac{1}{2}^-} \frac{x}{2} \quad (2.0.3)$$

$$= \frac{1}{2} - \frac{1}{4} \quad (2.0.4)$$

$$= \frac{1}{4} = 0.25 \quad (2.0.5)$$