AI1103-Assignment 2

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Download all python codes from

https://github.com/Shambu−K/Assignment−2/blob/main/assignment−1.py

and latex-tikz codes from

https://github.com/Shambu−K/Assignment−2/blob/main/Assignment−1.tex

Question

(GATE EC-73)
Let X be a random variable with the following cumulative distribution function:

$$F(x) = \begin{cases} 0 & x < 0 \\ x^2 & 0 \le x < \frac{1}{2} \\ \frac{3}{4} & \frac{1}{2} \le x < 1 \\ 1 & x \ge 1. \end{cases}$$

Then $P\left(\frac{1}{4} < X < 1\right)$ is equal to _____

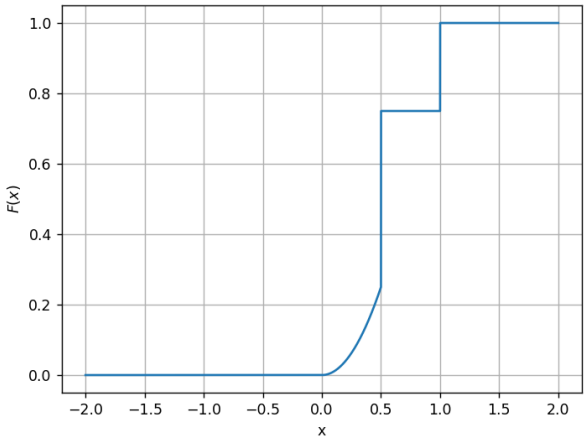

Fig. 0: The figure depicts the CDF of X

Solution

We know that,

$$\mathrm{P}(p < X < q) = F\left(q^{-}\right) - F\left(p\right) \tag{0.0.1}$$

$$P\left(\frac{1}{4} < X < 1\right) = F\left(1^{-}\right) - F\left(\frac{1}{4}\right) \tag{0.0.2}$$

$$= \frac{3}{4} - \left(\frac{1}{4}\right)^2 \tag{0.0.3}$$

$$= \frac{11}{16} \tag{0.0.4}$$

$$= 0.6875 \tag{0.0.5}$$