AI1103 - Assignment 2

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PROBLEM

54. Let X be a random variable with the following cumulative distribution function:

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

Then, P($\frac{1}{4} <$ X < 1) is equal to.

SOLUTION

$$P(a < x < b) = F(b) - F(a) \tag{1}$$

We want,

$$S = P(\frac{1}{4} < X < 1) \tag{2}$$

$$S = [F(1) - F(\frac{1}{4})] \tag{3}$$

$$S = [\frac{3}{4} - \frac{1^2}{4^2}] \tag{4}$$

$$S = \frac{11}{16} \tag{5}$$

Hence, P($\frac{1}{4} <$ X < 1) is equal to $\frac{11}{16}$