

Assignment 3

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Download all python codes from

<https://github.com/gaureeshk/assignment2/blob/main/Codes/assignment2.py>

and latex-tikz codes from

<https://github.com/gaureeshk/assignment2/blob/main/assignment2.tex>

Hence,

$$\Pr(X < 0.5) = \int_0^{0.5} f(x)dx \quad (2.0.9)$$

$$= \int_0^{0.5} 2x dx \quad (2.0.10)$$

$$= 0.25 \quad (2.0.11)$$

Hence the required probability is 0.25

1 PROBLEM

A random variable X has probability density function $f(x)$ as shown below:

$$f(x) = \begin{cases} a + bx & \text{for } 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$$

If the expected value $E[X] = 2/3$, then $\Pr(X < 0.5)$ is _____

2 SOLUTION

Since the total probability is 1,

$$\int_{-\infty}^{\infty} f(x)dx = 1 \quad (2.0.1)$$

$$\Rightarrow \int_0^1 f(x)dx = 1 \quad (2.0.2)$$

$$\Rightarrow a + \frac{b}{2} = 1 \quad (2.0.3)$$

Also,

$$E[X] = \int_{-\infty}^{\infty} xf(x)dx \quad (2.0.4)$$

$$\frac{2}{3} = \int_0^1 (ax + bx^2)dx \quad (2.0.5)$$

$$\Rightarrow \frac{a}{2} + \frac{b}{3} = \frac{2}{3} \quad (2.0.6)$$

solving (2.0.3) and (2.0.6) we get,

$$a = 0 \quad (2.0.7)$$

$$b = 2 \quad (2.0.8)$$