Sec #5

Birzeit University
Faculty of Engineering and Technology
Department of Electrical and Computer Engineering
Probability and Engineering Statistics – ENEE 2307
Quiz #2

13 November 2024   Dr. Jaser Sa'ed   Time: 10 min

Student Name: Key Solution   ID Number:

Consider the probability density function $f_X(x)$ given below

$$f_X(x) = \begin{cases} \dfrac{2}{11}(x+2) & -1 \le x \le 1 \\ \dfrac{2}{11}(5-x) & 3 \le x \le 4 \\ 0 & otherwise \end{cases}$$

Determine the mean value of the random variable X.

$$\mu_x = E[X] = \int_{-\infty}^{\infty} x\, f_X(x)\, dx = \int_{-1}^{1} x \cdot \frac{2}{11}(x+2)\, dx + \int_{3}^{4} x \cdot \frac{2}{11}(5-x)\, dx$$

$$= \frac{2}{11}\int_{-1}^{1}(x^2+2x)\, dx + \frac{2}{11}\int_{3}^{4}(5x-x^2)\, dx$$

$$= \frac{2}{11}\left[\left(\frac{x^3}{3}+x^2\right)\Big|_{-1}^{1} + \left(5\frac{x^2}{2}-\frac{x^3}{3}\right)\Big|_{3}^{4}\right]$$

$$= \frac{2}{11}\left[\left(\frac{1}{3}+1\right)-\left(-\frac{1}{3}+1\right) + \left(\frac{5*16}{2}-\frac{64}{3}\right)-\left(\frac{5*9}{2}-\frac{27}{3}\right)\right]$$

$$= \frac{70}{66} = 1.0606$$