Probability Methods in Engineering

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Lecture 20

Expected Value of Continuous RV

➢ The expected value discrete RV X

$$E[X] = \sum_{k=1}^{\infty} x_k p_X(x_k)$$

➢ The expected value of continuous RV X

$$E[X] = \int_{-\infty}^{\infty} t\, f_X(t)\, dt$$

➢ Find the mean of a uniform random variable given by

$$f_X(x) = \begin{cases} \dfrac{1}{b-a} & a \le x \le b \\ 0 & x < a \text{ and } x > b \end{cases}$$

➤ The time X between customer arrivals at a service station has an exponential distribution. Find the mean interarrival time.

➤ The variance of continuous RV X

$$VAR[X] = E[(X - E[X])^2] = E[X^2] - E^2[X]$$

➤ The standard deviation of continuous RV X

$$STD[X] = \sqrt{VAR[X]}$$

➢ Find the variance of a uniform random variable given by

$$f_X(x) = \begin{cases} \dfrac{1}{b-a} & a \leq x \leq b \\ 0 & x < a \text{ and } x > b \end{cases}$$

➢ The time X between customer arrivals at a service station has an exponential distribution. Find the variance of interarrival time.