

Probability Methods in Engineering

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Lecture 20





Expected Value of Continuous RV

 \triangleright The expected value discrete RV X

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

 \triangleright 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

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





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





Variance of Continuous RV

> 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

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





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

