Chapter 28: Expected Values of Continuous Random Variables

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Learning Objectives

1. Calculate the mean (expected value) of a continuous RV

Expected value of a function of a continuous RV

How do we calculate expected values of discrete RVs?

For discrete RVs: weight average

$$\mathbb{E}[X] = \sum_{i=1}^{n} x_i p_X(x_i).$$

How do we calculate expected values of continuous RVs?

For continuous RVs:

Expected Value of the Uniform Distribution

Example 1

Let $f_X(x) = \frac{1}{b-a}$, for $a \leq x \leq b$. Find $\mathbb{E}[X]$.

Expected Value of the Exponential Distribution

Example 2

Let $f_X(x) = \lambda e^{-\lambda x}$, for $x > 0$ and $\lambda > 0$. Find $\mathbb{E}[X]$.

Expected value from a joint distribution

Example 3

Let $f_{X,Y}(x,y) = 2e^{-(x+y)}$, for $0 \leq x \leq y$. Find $\mathbb{E}[X]$.