Continuous Random Variables Applications

YOUR NAME

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Exercises

1. Let X be a continuous random variable on the domain $-k \leq X \leq k$. Also, let $f(x) = \frac{x^2}{18}$.

   a. Assume that $f(x)$ is a valid pdf. Find the value of k.

   b. Plot the pdf of X.

   c. Find and plot the cdf of X.

   d. Find $\mathrm{P}(X < 1)$.

   e. Find $\mathrm{P}(1.5 < X \leq 2.5)$.

   f. Find the 80th percentile of X (the value x for which 80% of the distribution is to the left of that value).

   g. Find the value x such that $\mathrm{P}(-x \leq X \leq x) = 0.4$.

   h. Find the mean and variance of X.

   i. Simulate 10000 values from this distribution and plot the density.

2. Let X be a continuous random variable. Prove that the cdf of X, $F_X(x)$ is a non-decreasing function. (Hint: show that for any $a < b$, $F_X(a) \leq F_X(b)$.)