SFU

STAT 330
Tutorial 3

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Assignment 1

Discrete Random Variable

1.6.2. Let a bowl contain 10 chips of the same size and shape. One and only one of these chips is red. Continue to draw chips from the bowl, one at a time and at random and without replacement, until the red chip is drawn.

(a) Find the pmf of X, the number of trials needed to draw the red chip.

(b) Compute $P(X \leq 4)$.

Discrete Random Variable

1.6.8. Let X have the pmf $p(x) = (\frac{1}{2})^x$, $x = 1, 2, 3, \ldots$, zero elsewhere. Find the pmf of $Y = X^3$.

Continuous Random Variable

1.7.24. Let $f(x) = \frac{1}{3}$, $-1 < x < 2$, zero elsewhere, be the pdf of X. Find the cdf and the pdf of $Y = X^2$.
Hint: Consider $P(X^2 \leq y)$ for two cases: $0 \leq y < 1$ and $1 \leq y < 4$.

Expectation

1.8.6. Let X have the pdf $f(x) = 3x^2$, $0 < x < 1$, zero elsewhere. Consider a random rectangle whose sides are X and $(1 - X)$. Determine the expected value of the area of the rectangle.

mgf

1.9.22. Let X have the pmf $p(x) = 1/k,\ x = 1, 2, 3, \ldots, k$, zero elsewhere. Show that the mgf is

$$M(t) = \begin{cases} \frac{e^t(1-e^{kt})}{k(1-e^t)} & t \neq 0 \\ 1 & t = 0. \end{cases}$$

Inequality

1.10.3. If X is a random variable such that $E(X) = 3$ and $E(X^2) = 13$, use Chebyshev's inequality to determine a lower bound for the probability $P(-2 < X < 8)$.

Questions