

(1) Suppose that X is a Geometric random variable with $p=1/3$
Find formulas for EX , $\text{Var}X$, and $P(2 < X < 5)$

$$EX=3 \quad \text{Var}X=6$$

Hints: look EX , $\text{Var}X$, $P(X=k)$ in Chapter 6 of the textbook. Note that

$$P(2 < X < 5) = \sum_{k=3}^4 P(X=k) = \left(\frac{2}{3}\right)^2 \cdot \frac{1}{3} + \left(\frac{2}{3}\right)^3 \cdot \frac{1}{3} = \frac{20}{81}$$

(2) Suppose that X is a continuous random variable with $f(x)=\exp(1-x)$ for $x>1$ and 0 otherwise. Find formulas for EX , $\text{Var}X$, and $P(2 < X < 5)$

$$EX = \int_1^{\infty} x e^{1-x} dx = 2$$

$$EX^2 = \int_1^{\infty} x^2 e^{1-x} dx = 5 \quad \text{Var}X = EX^2 - (EX)^2 = 1$$

$$P(2 < X < 5) = \int_2^5 e^{1-x} dx = -e^{1-x} \Big|_{x=2}^5 = e^{-1} - e^{-4}$$