

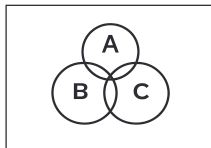
N

Geometric Random Variable

N

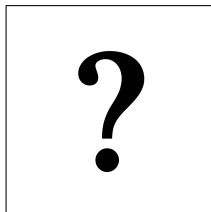


$$p = 0.25$$
$$X = \{1, 2, 3, \dots\}$$
$$PMF = ?$$
$$E[X] = ?$$



$$P(X = x) = (1 - p)^{x-1}p$$
$$P(X = 1) = 0.25$$
$$P(X = 2) = 0.75(0.25) = 0.1875$$
$$P(X = 3) = 0.75^2(0.25) = 0.1406$$

$$E[X] = 1/p = 1/0.25 = \boxed{4}$$

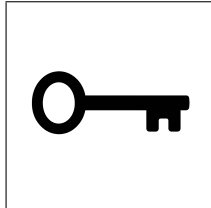


$$p = 0.4$$
$$X = \{1, 2, \dots\}$$

N

Geometric Random Variable

N



$$p = 0.4$$
$$X = \{1, 2, \dots\}$$

$$P(X = k) = (1 - p)^{k-1} p = (0.6)^{k-1} (0.4)$$

$$B(k) = 4000 - 1000(k - 1)$$

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

$$E[B] = \sum_{k=1}^4 [4000 - 1000(k - 1)] (0.6)^{k-1} (0.4)$$

$$E[B(1)] = 4000 \cdot 0.4 = 1600$$

$$E[B(2)] = 3000 \cdot (0.6 \cdot 0.4) = 3000 \cdot 0.24 = 720$$

$$E[B(3)] = 2000 \cdot (0.6^2 \cdot 0.4) = 2000 \cdot 0.144 = 288$$

$$E[B(4)] = 1000 \cdot (0.6^3 \cdot 0.4) = 1000 \cdot 0.0864 = 86.4$$

$$E[B] = 1600 + 720 + 288 + 86.4 = \boxed{2694.4}$$