

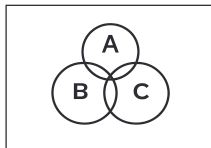
D

Geometric Random Variable

D

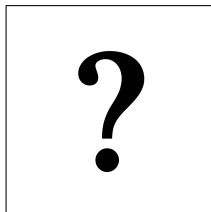


$$p = 0.25$$
$$X = \{1, 2, 3, \dots\}$$
$$PMF = ?$$
$$E[X] = ?$$



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

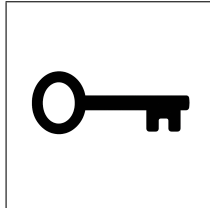
$$E[X] = 1/p = 1/0.25 = \boxed{4}$$



$$X = \{1, 2, \dots\}$$
$$p = 0.001$$
$$P(X \leq 2) = ?$$
$$E[X] = ?$$

D

Geometric Random Variable

D

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

$$p = 0.001$$

$$P(X \leq 2) = ?$$

$$E[X] = ?$$

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

$$P(X \leq 2) = P(X = 1) + P(X = 2)$$

$$P(X \leq 2) = p + (1 - p)p$$

$$P(X \leq 2) = p(1 + (1 - p))$$

$$P(X \leq 2) = p(2 - p)$$

$$P(X \leq 2) = 0.001 \times (2 - 0.001)$$

$$P(X \leq 2) = 0.001 \times 1.999$$

$$P(X \leq 2) = \boxed{0.001999}$$

$$E[X] = \frac{1}{p} = \frac{1}{0.001} = \boxed{1000}$$