

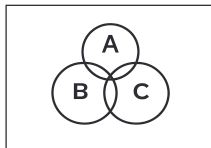
# E

## Geometric Random Variable

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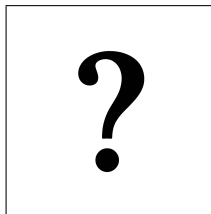


$$p = 0.25$$
$$X = \{1, 2, 3, \dots\}$$
$$PMF = ?$$
$$E[X] = ?$$



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

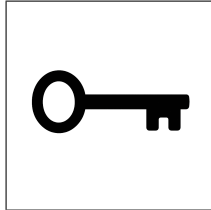
$$E[X] = 1/p = 1/0.25 = \boxed{4}$$



$$p = \frac{2}{6} = \frac{1}{3}$$
$$q = 1 - p = 2/3$$
$$X = \{1, 2, 3, \dots\}$$
$$P(X = 3) = ?$$
$$P(X = 50) = ?$$
$$E[X] = ?$$

**E**

# Geometric Random Variable

**E**

$$p = \frac{2}{6} = \frac{1}{3}$$

$$q = 1 - p = 2/3$$

$$X = \{1, 2, 3, \dots\}$$

$$P(X = 3) = ?$$

$$P(X = 50) = (2/3)^{49} (1/3) = ?$$

$$E[X] = ?$$

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$$P(X = k) = (1 - p)^{k-1} p = \left(\frac{2}{3}\right)^{k-1} \left(\frac{1}{3}\right)$$

$$P(X = 3) = \left(\frac{2}{3}\right)^2 \left(\frac{1}{3}\right) = \frac{4}{9} \cdot \frac{1}{3} = \boxed{\frac{4}{27}}$$

$$P(X = 50) = \boxed{\left(\frac{2}{3}\right)^{49} \left(\frac{1}{3}\right)}$$

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$$E[X] = \frac{1}{p} = \frac{1}{1/3} = \boxed{3}$$