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Geometric Random Variable

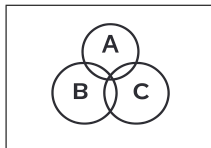
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$$p = 0.25$$

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

$$PMF = ?$$

$$E[X] = ?$$



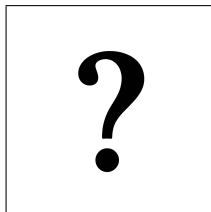
$$P(X = x) = (1 - p)^{x-1}p$$

$$P(X = 1) = 0.25$$

$$P(X = 2) = 0.75(0.25) = 0.1875$$

$$P(X = 3) = 0.75^2(0.25) = 0.1406$$

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



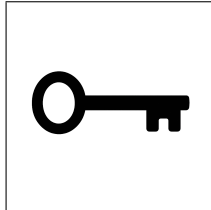
$$n = 20$$

$$p = 0.03$$

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

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$$\begin{aligned}n &= 20 \\p &= 0.03 \\P(X \geq 2) &= ?\end{aligned}$$

$$\begin{aligned}P(X \geq 2) &= 1 - P(X = 0) - P(X = 1) \\P(X \geq 2) &= 1 - (0.97)^{20} - \binom{20}{1}(0.03)(0.97)^{19} \\P(X \geq 2) &= 1 - 0.97^{20} - 20 \cdot 0.03 \cdot 0.97^{19} \approx 1 - 0.5439 - \\0.3363 &= \boxed{0.1198}\end{aligned}$$