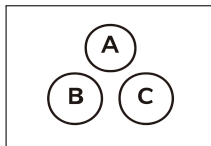
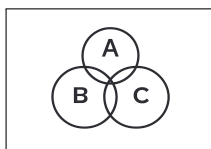


20 Discrete Distribution Exp Value / Variance



$$n = 6$$

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



$$E[X] = np = 6 \cdot \frac{1}{2} = \boxed{3}$$

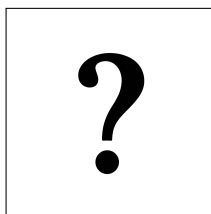
$$\text{Var}(X) = np(1-p) = 3 \cdot \frac{1}{2} = \boxed{\frac{3}{2}}$$

$$E[X^2] = \text{Var}(X) + (E[X])^2$$

$$E[X^2] = \frac{3}{2} + 3^2$$

$$E[X^2] = \frac{3}{2} + 9$$

$$E[X^2] = \boxed{\frac{21}{2}}$$



$$n = 10$$

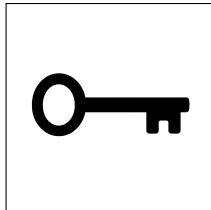
$$p = 0.4$$

$$E[X] = ?$$

$$\sigma_X = ?$$

$$P[E(X) - \sigma_X \leq X \leq E(X) + \sigma_X] = ?$$

20 Discrete Distribution Exp Value / Variance



$$\begin{aligned}n &= 10 \\p &= 0.4 \\E[X] &= ? \\ \sigma_X &= ? \\P[E(X) - \sigma_X \leq X \leq E(X) + \sigma_X] &= ?\end{aligned}$$

$$E[X] = np = 10(0.4) = \boxed{4}$$

$$\sigma_X = \sqrt{np(1-p)} = \sqrt{10 \cdot 0.4 \cdot 0.6} \approx \boxed{1.549}$$

$$P[E(X) - \sigma_X \leq X \leq E(X) + \sigma_X] = P[4 - 1.549 \leq X \leq 4 + 1.549] = P[2.451 \leq X \leq 5.549]$$

$$P(X \in \{3, 4, 5\}) = \sum_{k=3}^5 \binom{10}{k} (0.4)^k (0.6)^{10-k}$$

$$P(X = 3) = \binom{10}{3} 0.4^3 0.6^7 \approx 0.21499$$

$$P(X = 4) = \binom{10}{4} 0.4^4 0.6^6 \approx 0.25082$$

$$P(X = 5) = \binom{10}{5} 0.4^5 0.6^5 \approx 0.20066$$

$$P(3 \leq X \leq 5) \approx 0.21499 + 0.25082 + 0.20066 = 0.66647$$

$$P[E(X) - \sigma_X \leq X \leq E(X) + \sigma_X] \approx \boxed{0.6665}$$