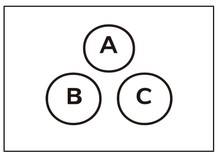
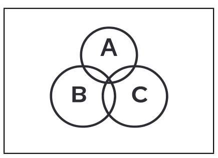
Expected Value & Variance
Binomial Distribution



$n = 6$

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



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

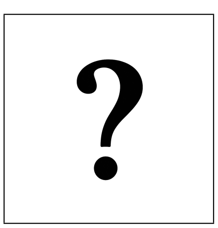
$\text{Var}(X) = np(1-p) = 3 \cdot \frac{1}{2} = \boxed{\frac{3}{2}}$

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

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

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

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



$n = 10$

$p = 0.4$

$E[X] = ?$

$\sigma_X = ?$

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

Expected Value & Variance
Binomial Distribution

$n = 10$
$p = 0.4$
$E[X] = ?$
$\sigma_X = ?$
$P[E(X) - \sigma_X \leq X \leq E(X) + \sigma_X] = ?$

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

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

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

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

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

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

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

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

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