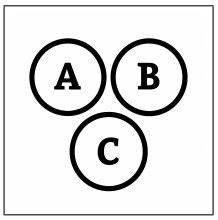
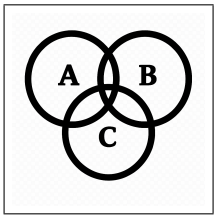
Variance / SD



$X = \{1, 2, 3, 4, 5, 6\}$

$P(X = x) = \frac{1}{6}$



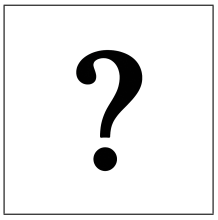
$E(X) = \sum_{x=1}^{6} x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$

$E(X^2) = \sum_{x=1}^{6} x^2 \cdot \frac{1}{6} = \frac{1^2+2^2+3^2+4^2+5^2+6^2}{6} = \frac{91}{6}$

$\text{Var}(X) = E(X^2) - [E(X)]^2 = \frac{91}{6} - (3.5)^2 = \frac{91}{6} - \frac{49}{4} = \frac{182-147}{12} = \frac{35}{12} = \frac{35}{12}$

$\text{SD}(X) = \sqrt{\text{Var}(X)} = \sqrt{\frac{35}{12}} = \sqrt{\frac{35}{12}} \approx 1.708$

$\text{Var}(4X + 2) = 16\,\text{Var}(X)$



$P(X = 0) = 1 - p$

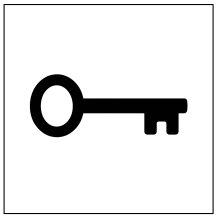
$P(X = 1) = p$

$E(X) = ?$

$E(X^2) = ?$

$\text{Var}(X) = ?$

Variance / SD



$P(X = 0) = 1 - p$
$P(X = 1) = p$
$E(X) = ?$
$E(X^2) = ?$
$\text{Var}(X) = ?$

$E(X) = 0 \cdot P(X = 0) \ + \ 1 \cdot P(X = 1)$
$E(X) = (0)(1 - p) + (1)(p)$
$E(X) = p$

$E(X^2) = \sum_x x^2, P(X = x)$
$E(X^2) = 0^2(1 - p) + 1^2(p) = p$
$E(X^2) = p$

$\text{Var}(X) = E(X^2) - [E(X)]^2$
$\text{Var}(X) = p - p^2$
$\text{Var}(X) = p(1 - p)$