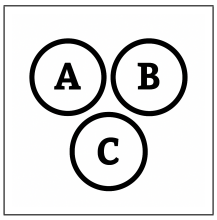
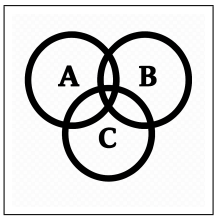
A Expected Value - Function A



$Y = 20 - 2X$

$E(X) = 6$

$E(Y) = ?$

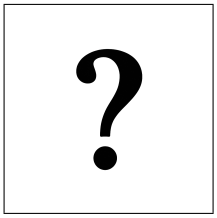


$E(Y) = E(20 - 2X)$

$E(20 - 2X) = E(20) - 2E(X)$

$E(20) = 20$

$E(Y) = 20 - 2(6) = 20 - 12 = 8$



$x = \{1, 2, 3, 4\}$

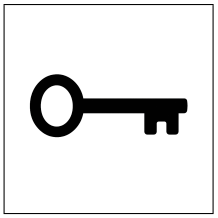
$p(x) = cx^2$

$c = ?$

$E(X) = ?$

$E(X(X - 1)) = ?$

A Expected Value - Function A



$x = \{1, 2, 3, 4\}$
$p(x) = cx^2$
$c = ?$
$E(X) = ?$
$E(X(X-1)) = ?$

$\sum_{x=1}^{4} cx^2 = 1 \Rightarrow c\sum_{x=1}^{4} x^2 = 1$

$\sum_{x=1}^{4} x^2 = 1^2 + 2^2 + 3^2 + 4^2 = 1 + 4 + 9 + 16 = 30$

$c = \frac{1}{30}$

$E(X) = \sum x \cdot p(x) = \sum_{x=1}^{4} x \cdot cx^2 = c\sum_{x=1}^{4} x^3$

$\sum_{x=1}^{4} x^3 = 1^3 + 2^3 + 3^3 + 4^3 = 1 + 8 + 27 + 64 = 100$

$E(X) = \frac{1}{30} \cdot 100 = \frac{10}{3}$

$E(X(X-1)) = \sum x(x-1) \times p(x) = \sum_{x=1}^{4} x(x-1) \times cx^2 = c\sum_{x=1}^{4} x(x-1)x^2$

$x(x-1)x^2 = x^3(x-1)$

$\sum_{x=1}^{4} x^3(x-1) = \sum_{x=1}^{4} (x^4 - x^3)$

$x = 1: 1^4 - 1^3 = 0$
$x = 2: 16 - 8 = 8$
$x = 3: 81 - 27 = 54$
$x = 4: 256 - 64 = 192$

$\sum_{x=1}^{4} x^3(x-1) = 0 + 8 + 54 + 192 = 254$

$E(X(X-1)) = \frac{1}{30} \cdot 254 = \frac{127}{15} \approx 8.47$