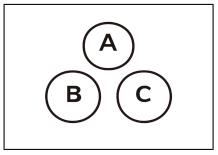
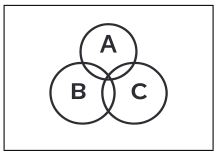
Hyper-geometric Random Variable



$N = 5$
$K = 2$
$n = 2$
$k = 1$



$$P(X = k) = \frac{\binom{K}{k}\binom{N-K}{n-k}}{\binom{N}{n}}$$

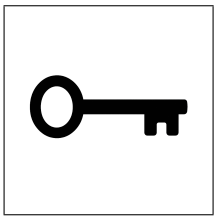
$$P(X = 1) = \frac{\binom{2}{1}\binom{3}{1}}{\binom{5}{2}} = \frac{2 \times 3}{10} = \frac{6}{10} = \boxed{0.6}$$

$$E[X] = n\frac{K}{N}$$

$$\text{Var}(X) = n\frac{K}{N}\left(1 - \frac{K}{N}\right)\frac{N-n}{N-1}$$

$N = 10$
$K = 7$
$n = 4$
$P(X \leq 1) = ?$

Hyper-geometric Random Variable



$N = 10$
$K = 7$
$n = 4$
$P(X \leq 1) = ?$

$$P(X = k) = \frac{\binom{K}{k}\binom{N-K}{n-k}}{\binom{N}{n}}$$

$$P(X \leq 1) \;=\; P(X = 0) + P(X = 1)$$

$$P(X = 0)\binom{3}{4} = 0 \implies P(X = 0) = 0$$

$$P(X = 1) = \frac{\binom{7}{1}\binom{3}{3}}{\binom{10}{4}} = \frac{7 \times 1}{210} = \frac{7}{210} = \frac{1}{30}$$

$$P(X \leq 1) = 0 + \frac{1}{30} = \frac{1}{30} \approx \boxed{0.0333}$$