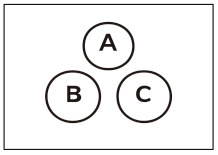
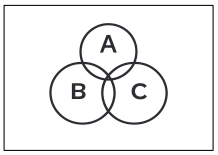
K Hyper-geometric Random Variable K



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



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

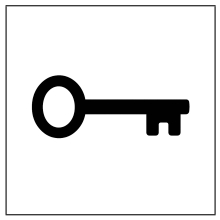
$$P(X = 1) = \frac{\binom{2}{1}\binom{3}{1}}{\binom{5}{2}} = \frac{2 \times 3}{10} = \frac{6}{10} = \boxed{0.6}$$

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

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

$N = 25$
$K = 10$
$n = 10$
$E[X] = ?$
$\text{Var}(X) = ?$

Hyper-geometric Random Variable



$N = 25$
$K = 10$
$n = 10$

$$E[X] = n\frac{K}{N} = 10 \cdot \frac{10}{25} = 4$$

$$\text{Var}(X) = n\frac{K}{N}\left(1 - \frac{K}{N}\right)\frac{N-n}{N-1} = 10 \cdot \frac{10}{25} \cdot \frac{15}{25} \cdot \frac{25-10}{24} = 1.5$$

$$\text{Var}(X)/E[X] = 1.5/4 = 0.375 = 3/8 \approx 0.375$$