

# E

## Hyper-geometric Random Variable

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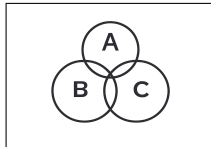


$$N = 5$$

$$K = 2$$

$$n = 2$$

$$k = 1$$

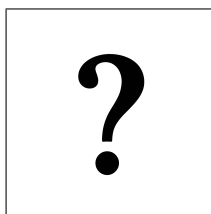


$$P(X = k) = \frac{\binom{K}{k} \binom{N-K}{n-k}}{\binom{N}{n}}$$

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

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

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



$$N = 200$$

$$K = 10$$

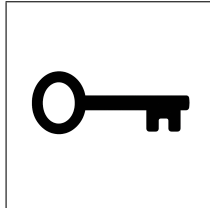
$$n = 10$$

$$k = 2$$

$$P(X = 2) = ?$$

**E**

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$$\begin{aligned}N &= 200 \\K &= 10 \\n &= 10 \\k &= 2 \\P(X = 2) &= ?\end{aligned}$$

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

$$P(X = 2) = \frac{\binom{10}{2} \binom{200 - 10}{10 - 2}}{\binom{200}{10}}$$

$$P(X = 2) = \frac{\binom{10}{2} \binom{190}{8}}{\binom{200}{10}}$$

$$P(X = 2) = \frac{45 \times \binom{190}{8}}{\binom{200}{10}}$$

$$P(X = 2) \approx \boxed{0.07}$$