

# F

## Hyper-geometric Random Variable

# F

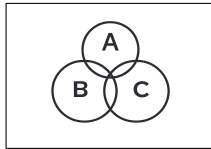


$$N = 5$$

$$K = 2$$

$$n = 2$$

$$k = 1$$

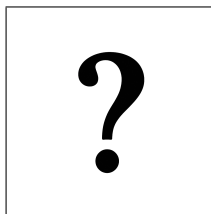


$$P(X = k) = \frac{\binom{K}{k} \binom{N-K}{n-k}}{\binom{N}{n}}$$

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

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

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



$$N = 8$$

$$K = 6$$

$$n = 4$$

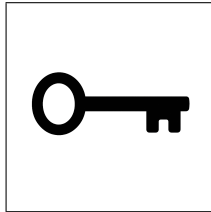
$$P(X = 4) = ?$$

$$E[X] = ?$$

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

**F**

# Hyper-geometric Random Variable

**F**

$$N = 8$$

$$K = 6$$

$$n = 4$$

$$k = 4$$

$$P(X = 4) = ?$$

$$E[X] = ?$$

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

---

$$P(X = 4) = \frac{\binom{6}{4} \binom{2}{0}}{\binom{8}{4}} = \frac{15 \cdot 1}{70} = \frac{15}{70} = \frac{3}{14} \approx \boxed{0.2143}$$

---

$$E[X] = 4 \cdot \frac{6}{8}$$

$$E[X] = 4 \cdot 0.75$$

$$E[X] = \boxed{3}$$

---

$$\text{Var}(X) = 4 \cdot \frac{6}{8} \cdot \frac{2}{8} \cdot \frac{8-4}{7}$$

$$\text{Var}(X) = 4 \cdot 0.75 \cdot 0.25 \cdot \frac{4}{7}$$

$$\text{Var}(X) = \frac{192}{448}$$

$$\text{Var}(X) = \frac{3}{7}$$

$$\text{Var}(X) \approx \boxed{0.43}$$