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Hyper-geometric Random Variable

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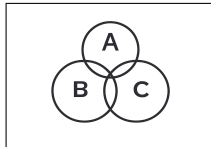


$$N = 5$$

$$K = 2$$

$$n = 2$$

$$k = 1$$

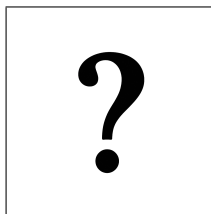


$$P(X = k) = \frac{\binom{K}{k} \binom{N - K}{n - k}}{\binom{N}{n}}$$

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

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

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



$$N = 25$$

$$K = 5$$

$$n = 10$$

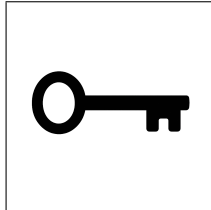
$$E[X] = ?$$

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

$$\sigma_X = ?$$

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$$\begin{aligned}N &= 25 \\K &= 5 \\n &= 10 \\E[X] &= ? \\Var(X) &= ? \\\sigma_X &= ?\end{aligned}$$

$$E[X] = n \frac{K}{N} = 10 \cdot \frac{5}{25} = \boxed{2}$$

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

$$Var(X) = 10 \cdot \frac{5}{25} \cdot \frac{20}{25} \cdot \frac{15}{24}$$

$$Var(X) = \boxed{1}$$

$$\sigma_X = \sqrt{Var(X)} = \boxed{1}$$