

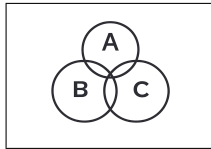
O

Hyper-geometric Random Variable

O



$$\begin{aligned}N &= 5 \\K &= 2 \\n &= 2 \\k &= 1\end{aligned}$$

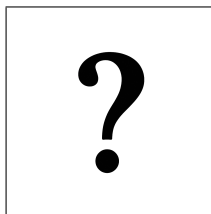


$$P(X = k) = \frac{\binom{K}{k} \binom{N - K}{n - k}}{\binom{N}{n}}$$

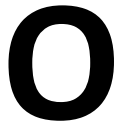
$$P(X = 1) = \frac{\binom{2}{1} \binom{3}{1}}{\binom{5}{2}} = \frac{2 \times 3}{10} = \frac{6}{10} = \boxed{0.6}$$

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

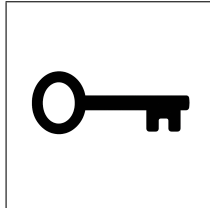
$$\text{Var}(X) = n \frac{K}{N} \left(1 - \frac{K}{N}\right) \frac{N - n}{N - 1}$$



$$\begin{aligned}N &= 20 \\K &= 11 \\n &= 7 \\P(X \geq 4) &= ?\end{aligned}$$



Hyper-geometric Random Variable



$$\begin{aligned}N &= 20 \\K &= 11 \\n &= 7 \\P(X \geq 4) &= ?\end{aligned}$$

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

$$P(X = 4) = 330 \times 84 = 27\,720$$

$$P(X = 5) = 462 \times 36 = 16\,632$$

$$P(X = 6) = 462 \times 9 = 4\,158$$

$$P(X = 7) = 330 \times 1 = 330$$

$$P(X \geq 4) = \sum_{k=4}^7 \frac{\binom{11}{k} \binom{9}{7-k}}{\binom{20}{7}}$$

$$P(X \geq 4) = \frac{48\,840}{77\,520} \approx \boxed{0.630}$$