

The Hypergeometric Random Variable

Choose a sample of size n randomly & without replacement from an urn containing N balls,

$$m = \# \text{ white balls}$$

$$N - m = \# \text{ black balls}$$

and let

$$X(b_1, \dots, b_n) = \# \text{ white balls selected}$$

Then,

defining
property of a
hypergeometric
r.v.

$$P(X=i) = \frac{\binom{m}{i} \binom{N-m}{n-i}}{\binom{N}{n}}$$

choices white balls *# choices black balls*

Prop. 1

$$E[X] = \frac{nm}{N}$$
$$\text{Var}(X) = np(1-p) \left(1 - \frac{n-1}{N-1}\right)$$

pf exercise!