

L-4

## Probability & Statistics.

$S \rightarrow$  sample space

$X: S \rightarrow \mathbb{R}$

pmf  $f(x) = P(X=x), x \in \mathbb{R}$

$F(x) = P(X \leq x)$

Uniform distribution

(probability model)

$\rightarrow$  comes from all outcomes which are equally likely.

### Finite probability model

Consider a collection  $N = N_1 + N_2$  number of objects,  $N_1$  of them belong to one of two dichotomous classes (exp. red chips) and  $N_2$  of them belong to the second class (exp. green chips).

Let  $n_i$  objects be selected from these  $N$  objects at random and without replacement.

Find that exactly  $x$  of these  $n$  objects belong to the first class, and  $n-x$  belong to the second class.

$$P(X=x) = \frac{\binom{N_1}{x} \binom{N_2}{n-x}}{\binom{N}{n}}$$

↓ 'hypergeometric distribution'

$$S = \{x_1, \dots, x_n\}, \quad p_i = p(x_i)$$

$$\text{'Entropy'} = -\sum p_i \log_2 p_i$$

Game: give you a lie

$$A = \{1, 2, 3\}, \quad B = \{4, 5\}, \quad C = \{6\}$$

If A occurs then you gain 1 rupee  
 B - - - - - 2 rupee  
 C - - - - - 3 rupee.

Q. How do I set an entry fee to the game?

