Summary of Tableau 2

Sampling from a population $\{a_1, \ldots, a_n\}$ of size n

- The number of ordered samples $(a_{j_1}, \ldots, a_{j_k})$ of size k:
  - Sampling with replacement: $n^k = \overbrace{n \times n \times \cdots \times n}^{k \text{ terms}}$
  - Sampling without replacement: $n^{\underline{k}} = n(n-1) \times \cdots \times (n-k+1)$
- The number of subpopulations $\{a_{j_1}, \ldots, a_{j_k}\}$ of size k: $\binom{n}{k} = \frac{n^{\underline{k}}}{k!}$
  - Alternative representations: $\binom{n}{k} = \frac{n!}{k!(n-k)!} = \binom{n}{n-k}$
  - Pascal's triangle: $\binom{n}{k} = \binom{n-1}{k} + \binom{n-1}{k-1}$
  - The binomial theorem: $(p+q)^n = \sum_{k=0}^{n} \binom{n}{k} p^k q^{n-k}$