

Larsen and Marx 2.6: Combinatorics

These notes reflect material from our text, *Introduction to Mathematical Statistics and Its Applications, Fifth Edition*, by Richard J. Larsen and Morris L. Marx, Pearson, ISBN 978-0-321-69394-5, 2012.

Possible Methods of Counting

In counting a set of combinatorial structures, it is necessary to distinguish between *counting without replacement* and *counting with replacement*. We must also distinguish between counting *ordered* structures and counting *unordered* structures.

Casella and Berger present the relevant formulas in the following succinct table from their text *Statistical Inference* (2002, p.16). As an exercise, make up simple examples illustrating each of the four approaches. Describe what is being counted and tell how many such structures there are.

Table. Number of possible arrangements of size r from n objects

	Without replacement	With replacement
Ordered	$\frac{n!}{(n-r)!}$	n^r
Unordered	$\binom{n}{r}$	$\binom{n+r-1}{r}$

Exercises from Larsen and Marx, Section 2.6: 4, 10, 12, 17, 19, 28, 34, 41, 50, 57

To hand in for homework:

Homework exercises from Larsen and Marx, Section 2.6: 4, 28, 34, 57