

Today's Plan

Upcoming:

- Practice assignment 1

Last time:

- Sum & Product Rule

Today's topics:

Chapter 1: Combinatorics

- From last time:
 - 1.2: Permutations
- 1.3: Combinations with no repetition

Section 1.3: Combinations with No Repetition

Example: How many different sets of 3 people can we pick from a group of 6?

There are 6 choices for the first person, 5 for the second one, and 4 for the third one, so there are $6 \cdot 5 \cdot 4 = 120$ ways to do this.

Combinations with No Repetition

For n distinct objects, the number of combinations of r objects is denoted $C(n, r)$.

How can we calculate this value?

For each unique combination, how many equivalent orderings are there?

Combinations with No Repetition

Now we can answer our initial question:

How many ways are there to pick a set of 3 people from a group of 6 (disregarding the order of picking)?

Corollary: Let n and r be nonnegative integers with $r \leq n$.

Then $C(n, r) = C(n, n - r)$.

Note that “picking a group of r people from a group of n people” **is the same as** “splitting a group of n people into a group of r people and another group of $(n - r)$.

Example

A soccer club has 8 female and 7 male members. For today's match, the coach wants to have 6 female and 5 male players on the grass. How many possible configurations are there?

Combinations Example

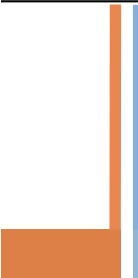
A student taking a history examination is directed to answer any seven of 10 essay questions.

- a) How many ways can the student choose the questions to answer?

- b) What if the student must answer three questions from the first five and four questions from the last five?

Combinations Example – cont'd...

- c) What if the student must answer seven of the 10 questions where at least three are selected from the first five?



Combinations Example – cont'd...

