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 <= 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…