Manuscript for Section 9.2 (II)

Objectives:

- Combinations

**Combination:** No ordering (ordering of elements are not important). No replacement. Let us start with a simple example.

Example: From a group of 10 students, a committee is to be chosen to meet with the dean. How many different 3-person committees are possible?

Answer: We need to chose 3 people out of 10. The order is not matter. The committee is not ordered. And, there is no replacement. The problem is a combination problem and there are 120 ways to chose 3-person committees.

**Definition:** The combination of n element taken r at a time is

\[ nC_r = \frac{n!}{(n-r)!r!} \]

Example: Find the combination of 10 elements taken 4 at a time?
Example: Three manager are to be selected from a group of 30 managers to work on a special project.

(a) In how many different ways can the managers be selected?

(b) In how many ways can the group of 3 be selected if a certain manager must work on the project?

Classwork numbers 1, 2, 3.

(c) In how many ways can a “nonempty” group of “at most 3” managers be selected from these 30 managers?

Example: Five cards are dealt from standard 52-card deck.

(a) How many hands have all face cards?

(b) How many hands have exactly 2 hearts?

(c) How many 5-card hands have all cards of a single suit?

Classwork 4, 5.