# MTH 225: Discrete Structures for Computer Science 1

## Daily Preparation, Module 8A: Combinations and permutations

**Due by:** 11:59pm ET, Tuesday, October 27

**Estimated time requirement:** About 45-60 minutes for the whole assignment. *If you have worked on this assignment for 30 minutes and you're not at least halfway done, DON'T work any further* — instead, *stop and ask for help* on the `#dailyprep` channel on CampusWire. Remember these are graded just on completeness and effort — try to be right and understand everything, but don't get bogged down if you get stuck. Just give a good effort and move on, and ask a question.

## Overview

Module 8 is the second of a three-module sequence on **counting complex arrangements**. In Module 8A, we look at two kinds of problems similar to but slightly different than the ones that gave us the binomial coefficient: Counting *arrangements* of things. We'll look at how to count the number of ways to arrange $n$ different objects, then how to arrange $k$ elements chosen from a collection of $n$ objects. In the process we will discover a **closed formula** for the binomial coefficient $\binom{n}{k}$.

## What you will learn

**Learning Targets addressed in this module:**

- **C.3 (Core)**: I can compute combinations and permutations and apply these to formulate and solve counting problems.

**BEFORE** your class meeting, use the Resources for Learning (below) to learn how to do the following:

- Compute $n!$ ($n$ factorial) where $n$ is a natural number.
- Determine the number of permutations of a collection of $n$ objects.
- Determine the number of $k$-permutations of $n$ objects.
- State a closed formula for $\binom{n}{k}$.

**DURING AND AFTER** your class meeting, you will learn how to do the following:

- Solve counting problems that involve combinations and permutations.

## Resources for Learning

**Video: First**, watch these:

- What is a factorial (1:43) https://www.youtube.com/watch?v=EyQXHRHtTFk
- Permutation formula (7:34) https://www.youtube.com/watch?v=DROZVHObeko (Not a great title to this one. It's really about counting $k$-permutations and finding $P(n,k)$.)

**Text:** Once you've watched those videos, then go and read Section 1.3 from the Levin text, especially the "Closed formula for $\binom{n}{k}$ and the discussion just before it — that's not covered in the videos.

You are free to search for and use other resources in addition to, or instead of the above, as long as you can work the exercises below.

## Exercises

The exercises are on the following Google Form: https://bit.ly/37kVoip

## Submission, grading, and getting help

**Submitting your work:** Your work is to be done on Classkick using the link/code above. Classkick saves your work as you go, so there's nothing to submit – just do the work and you're good.

**How this is graded:** Daily Prep assignments are graded on the basis of *completeness and effort*: If your submission has **all parts completed** (no blank entries, even if left blank accidentally) and **a good-faith effort to provide a correct solution or explanation is given** (no responses of "I don't know" or "I didn't understand") and **the work is submitted on time**, it gets a "check". Otherwise it gets an "x". If you are stuck on an item, you're expected to ask questions and give your best effort.

**Getting help on this assignment:** *You may work with others on this assignment, but you may not copy each others' answers.* Evidence of copying will be treated as academic dishonesty. You may also ask questions on the #dailyprep channel on CampusWire, but you may not ask simply to be given the answers; giving and receiving answers on CampusWire will be treated as academic dishonesty.