MTH 225: Discrete Structures for Computer Science 1

Daily Preparation, Module 8B: Combinatorial proof

Due by: 11:59pm ET, Thursday, October 29

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

In the last few lessons, we've focused in on not just *computing* things but *explaining why things are true*. For example, we used logical reasoning to think about why the number of n-bit strings with weight k is the same as the number of k-element subsets of an n-element set. In this module, we will look at the concept of *mathematical proof* — what it is, and why computer scientists need it — and look at the concept of *combinatorial proof* where we prove mathematical statements by counting things.

What you will learn

Learning Targets addressed in this module:

- **P.1:** I can analyze and write a combinatorial proof of a combinatorial identity.

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

- Explain the concept of *mathematical proof* and why proofs are necessary for computer science.

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

- Do a critical analysis of a combinatorial proof and fill in missing steps and justifications for a written proof.

Resources for Learning

This time it's a little unusual because **you are not to do any video-watching or book reading in order to avoid spoilers**. Just go on down to the exercises.

Exercises

The exercises are on the following Google Form: https://bit.ly/34m1tsl

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.