

MTH 225: Discrete Structures for Computer Science

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Daily Preparation, Module 9A: Stars and bars

Due by: 11:59pm ET, **Tuesday, November 3** (Note the different date)

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

No, this module is not about drinking alcohol with celebrities. It's rather about an application of the binomial coefficient to specific type of counting problem, where we have a number of objects to distribute to a certain number of recipients, and we're trying to count the number of ways to do that. For example, how many ways are there to give out three identical cookies to five different children? We'll invent a visual way to represent this problem (hence the name, "stars and bars") and see how the binomial coefficient applies to it.

What you will learn

Learning Targets addressed in this module:

- **C.4:** I can use the "Stars and Bars" technique to formulate and solve counting problems.

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

- Explain the kinds of problems that are solved by the stars-and-bars technique.
- Given a problem that is solved using the stars-and-bars technique, draw the stars-and-bars chart for it.
- Given a stars-and-bars for a counting problem, state the distribution of items that goes along with it.

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

- Given a counting problem, identify whether stars-and-bars applies, and if so, solve the problem.

Resources for Learning

Reading: The introduction to [this section \(1.5\) in the Levin textbook](#) is very good this time, so read it carefully and follow along with the example it gives. Then study the other examples and try some of the interactive exercises at the end.

Video: There are numerous videos for the stars and bars method, but I recommend this one in particular:

- Stars and bars (and bagels) (16:11) <https://www.youtube.com/watch?v=UTCScjoPymA>

It's long, but very well done and engaging. When you watch it, note that **the actual application of stars and bars doesn't appear until the 6:00 mark** — the first part of the video is setting up a way to solve the problem that *doesn't* work particularly well, so that you'll appreciate the simplicity of the stars-and-bars method. If you find yourself getting a little lost in the first 6 minutes, that's actually intentional.

Exercises

The exercises are on the following Google Form: <https://bit.ly/37N0NPw>

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.