

# MTH 225: Discrete Structures for Computer Science 1

---

## Daily Preparation, Module 10A: Integer sequences

---

**Due by:** 11:59pm ET, Tuesday, November 10

**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 10 is all about **sequences of integers**, which play a surprisingly important role in computer science, as they tend to describe the number of ways to count certain sequences of outcomes. In Module 10A we will look at some overall basic tools for working with integer sequences, most importantly how to express them as **closed formulas** and with **recursive definitions**. Module 10A will be our first close look at *recursion*, which we first encountered with the binomial coefficient. We'll meet some important sequences such as the **triangular numbers** and the **Fibonacci numbers** and how to work with the mathematical symbols  $\sum$  and  $\prod$  for adding up and multiplying, respectively, the terms of a sequence.

## What you will learn

---

**Learning Targets addressed in this module:**

- **SR.1 (Core):** I can generate several values in a sequence defined using a closed-form expression or using recursion.
- **SR.2:** I can use sigma notation to rewrite a sum and determine the sum of an expression given in sigma notation.

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

- Explain the difference between a *closed formula* for a sequence and a *recursive definition* for a sequence.
- Given a closed formula for a sequence, generate the first 5-10 terms of the sequence.
- Given a recursive definition for a sequence, generate the first 5-10 terms of the sequence.
- State the first 5-10 terms of the *triangular numbers* and the *Fibonacci numbers*.

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

- Given a sequence, generate the first 5-10 terms of its sequence of partial sums.
- Find a closed formula for a sequence using known closed formulas for related sequences.
- Given a sequence of numbers or visual patterns, write a recursive definition that generates the sequence.
- Write a sum or product using  $\sum$  and  $\prod$  notation; and calculate sums and products given using these

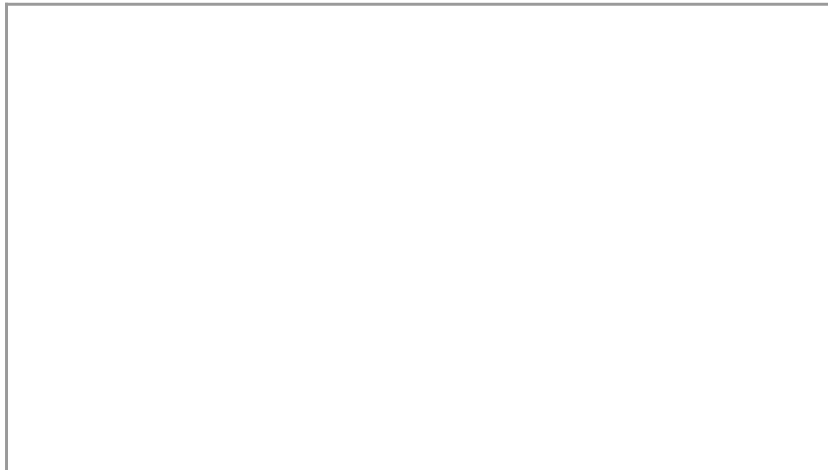
notations.

## Resources for Learning

---

**Reading:** [Read through Section 2.1 of the Levin textbook](#). Be sure to **read actively**: Take notes, ask questions, work through the examples, work through some of the exercises.

**Video:** No required videos this time. Although, if you want to learn some fun stuff about the Fibonacci numbers, check out this 7-minute TED talk:



Direct link: <https://youtu.be/SjSHVDfXHQ4>

## Exercises

---

The exercises are on the following Google Form:

[https://docs.google.com/forms/d/e/1FAIpQLSdg0tZ2zAzV7hybui2JFc7GiblmPrBYNG2bzKZ\\_vYSYRaic6g/viewform](https://docs.google.com/forms/d/e/1FAIpQLSdg0tZ2zAzV7hybui2JFc7GiblmPrBYNG2bzKZ_vYSYRaic6g/viewform)

## 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.

