Math Foundations of Computer Science

CS 200

About Me

- Shelby Kimmel (call me Professor Kimmel, Professor)
- **My research:** (quantum) Algorithms and Complexity
- **Academic Background:** Williams undergrad, MIT grad school, University of Maryland postdoc
- **Non-academic Background:** internships at Raytheon, Fulbright (English Teaching Assistant) South Korea

Find a partner or two, and brainstorm as many responses as you can to the following question:

- What is an example of a connection between math and computer science?

This Class:

In this course, you learn about mathematical objects, ideas, and techniques that are useful for computer science. This knowledge will allow you to communicate clearly with other computer scientists and programmers, and will be helpful in understanding many of the more complex concepts in computer science.

Learning Goals

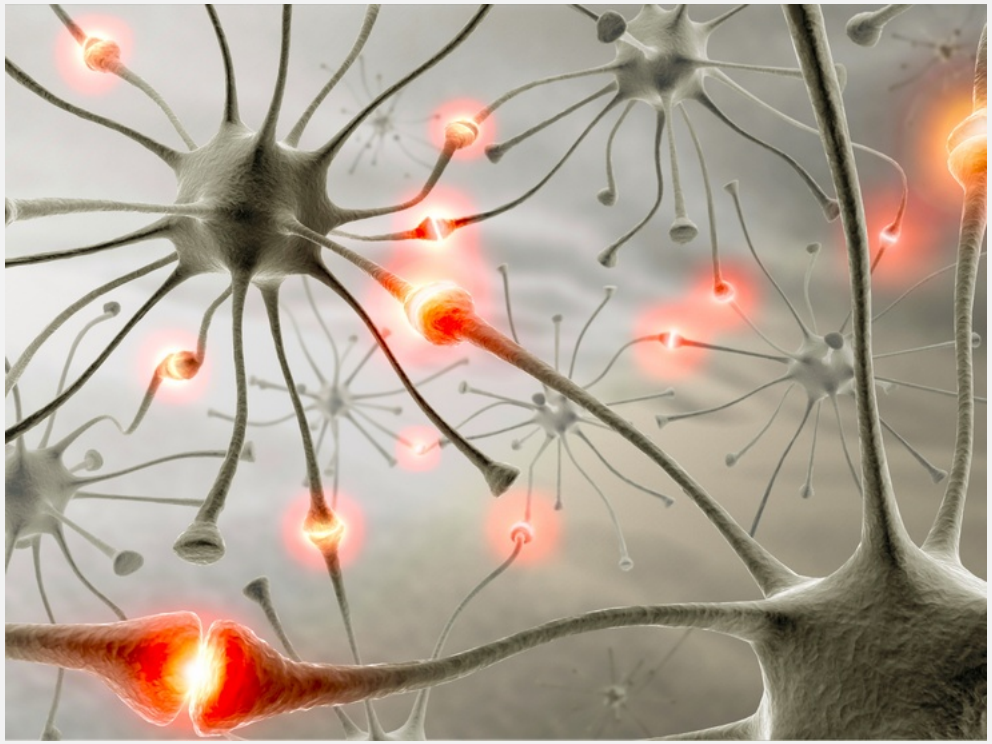
- Ability to think like a computer scientist (using the tools of mathematics).
- Ability to communicate like a computer scientist (using the language of mathematics).
- Proficiency using common mathematical tools of computer science.

My goal: Help you to learn about math and CS

- One of the best ways to become a better learner is to develop a **growth mindset**. [Dweck]

Learning from biological perspective

- Learning is the process of developing new connections between neurons in your brain.



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- Trying to do a task for the first time can sometimes feel unpleasant…

Learning from growth mindset perspective

Fixed Mindset	Growth Mindset
Task A is easy because I'm smart.	This is easy because my brain already has necessary connections.
Task B hard because I'm bad at this type of thinking.	This is hard because I need to create connections in my brain that weren't there before.

Self-test

	Fixed Mindset Reaction (0 pt each)	Growth Mindset Reaction (1 pt each)
Challenges	Avoid	Embrace
Effort	Problem	Progress
Criticism	Personal	Helpful
Failure	Evidence of inability	Temporary
Success of others	Threatening	Inspiring

Take away

- Even if you don't have a growth mindset now, you can develop one, because the brain is malleable!

- Developing a growth mindset will tend to increase your learning (grade) and make learning more enjoyable.

Active Learning

- In class, I will often ask you to solve problems and answer questions. (This helps you to build new connections in your brain.)
- Because you are learning, I don't expect you to answer correctly. Won't be graded on response (other than for participation)
- Opportunity for you to get feedback on whether you understand.
- Opportunity for me to get feedback on whether you understand.

Syllabus – with a partner:

- What are 3 questions you have about the syllabus?
- Questions similar to quiz questions:
  - What is the purpose of Part 2 of the problem set?
  - What is my policy on technology in the classroom?
  - If you have difficulty with a problem set problem, which of the following options are acceptable?
    - go to office hours
    - e-mail me
    - discuss with a classmate
    - look online for solutions
    - do the best you can, then for Part II write a reflection about what you had difficulties with, and why.

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    - do the best you can, then for Part II write a reflection about what you had difficulties with, and why. Try to solve the problem from scratch once you've seen a sample solution

Website tour!

go/CS200

Announcements

- Math major? Maybe you don't need to take this class
- Taken a 100-level course? If not, you need permission to take this class
- Switch sections? (A to B)
- Fill out questionnaire
- Quiz Friday on syllabus
- First problem set/programming assignment due Monday
- Not registered – come talk to me.
- Pictures!