CSCI 246 – Discrete Structures

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Delayed start

We will start at 2:15 today due to the last-minute room change.

Feel free to

- Check out the syllabus ahead of time on Brightspace
- Meet a neighbor
- Meditate
- Brag to your friends about how much you're going to learn about discrete structures!

Syllabus Review

See Brightspace for syllabus.

What is Discrete Math

dis·crete / dis'krēt.

Adjective: Individually separate and distinct.

Synonyms: separate - detached - distinct - abstract.

Why Active Learning?

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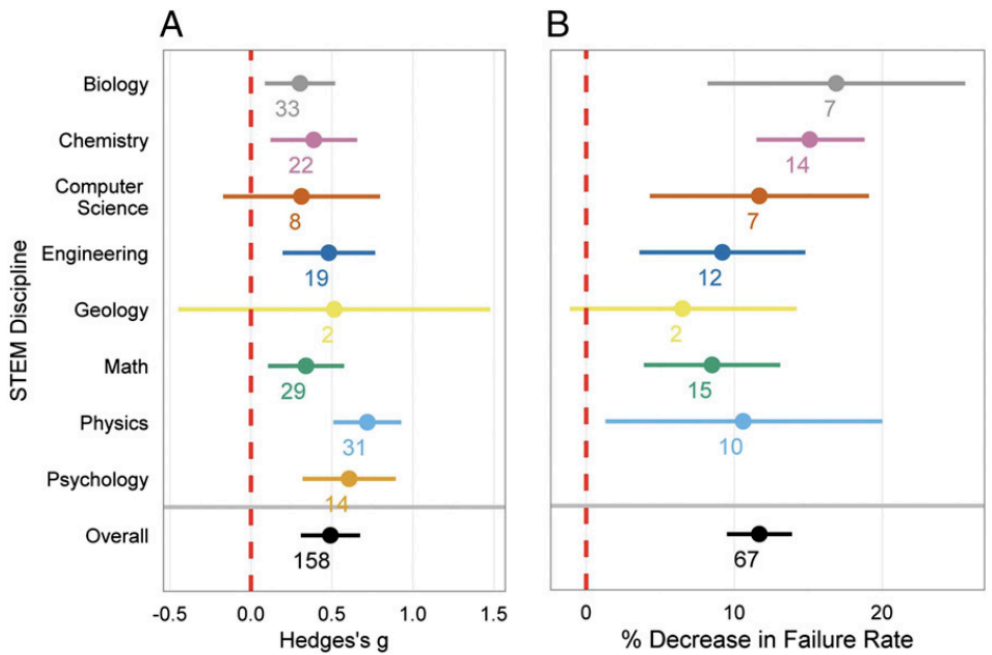
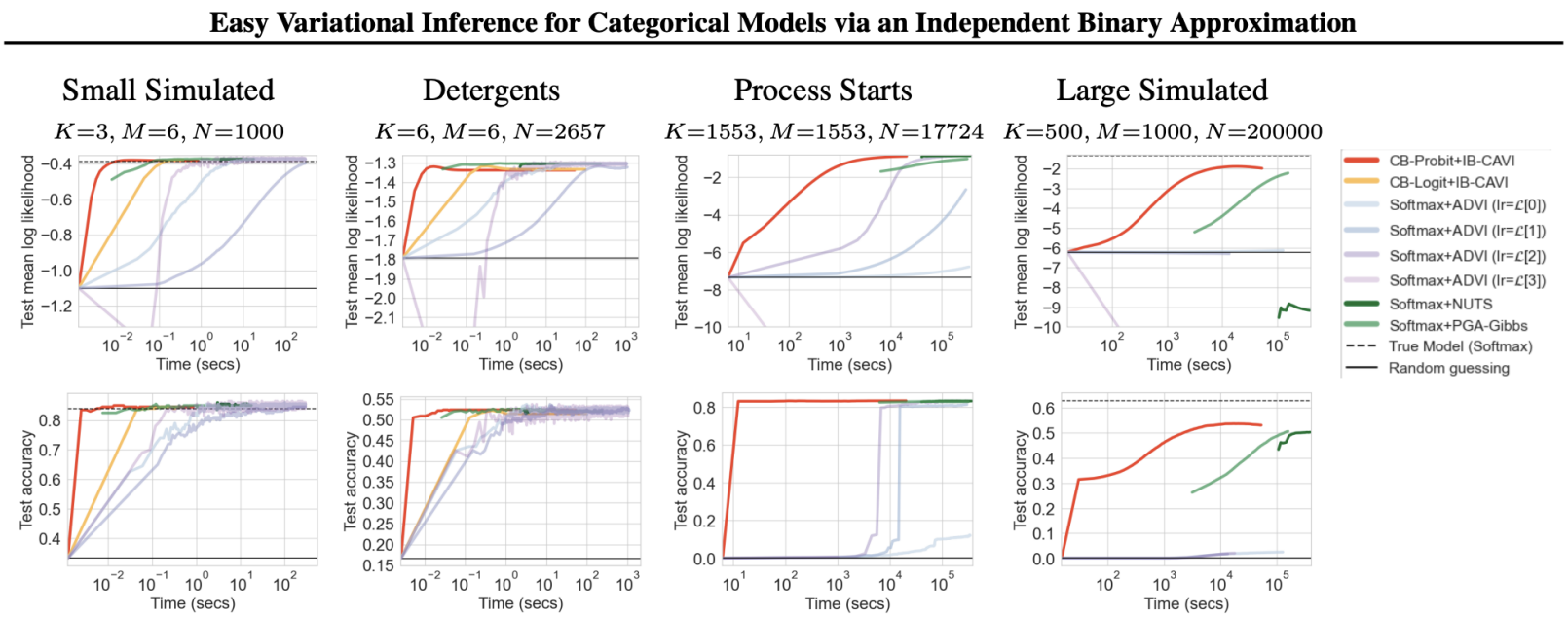


Freeman et al. (2014). *Proceedings of the National Academy of Sciences*.

Virtues of developing mathematical reasoning

- Literally makes you smarter (GRE scores).
- Enhances study of *any* domain – not only computer science, but also cybersecurity, sociology, etc.
- Enhances performance at work – often, math gets the job done better.
- $$$

Virtues of developing mathematical reasoning



Wojnowicz et al. (2022). *International Conference of Machine Learning (ICML)*.

Don't like math?

- Be open-minded! Don't stereotype yourself.
- We're starting from scratch. (No calculus!)
- Stay on track by doing daily assignments.
- Use resources (office hours, tutoring, classmates, etc.)
- *Growth mindset*: Anyone can improve from where they are.
- *Culture of confusion*: It's great to be wrong! That's how we learn.
- Contact me if you're struggling.

Discrete math: Example application

Find subtle DNA copy number alterations to support **early cancer detection**.

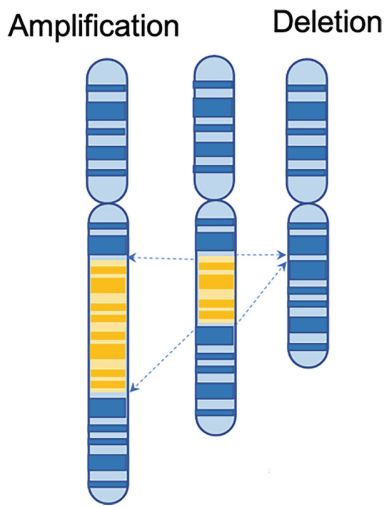
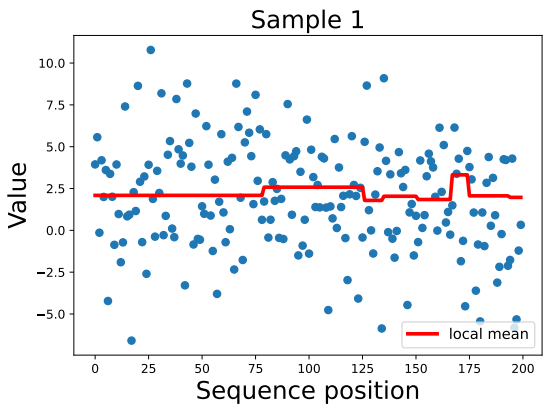
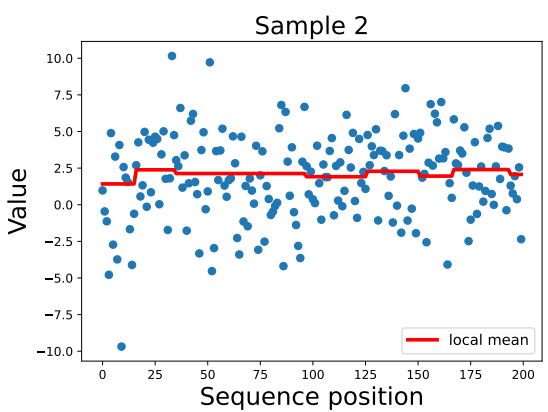


Image from: Nabavi & Zare (2022).

How to detect changepoints within heavy noise?





The solution to this problem uses almost every content area we're covering in this course

- Discrete probability
- Counting
- Complexity (Big-O notation)
- Recursions
- Graph theory
- Proof techniques