Welcome!

CS 103ACE Day 1 – 4/5/24

Agenda:

- Course info
- Intros
- Applying set operations
- Power sets

ACE Info

Website: cs103ace.stanford.edu
Slack: cs103acespring2024.slack.com

What to expect from ACE section

- **Concept review**
  - Will assume you have watched the previous lecture (Wednesday's lecture for Friday section, Friday's lecture for Monday section)
- **Practice problems**, focusing on **key strategies** relevant to the next week's problem set
  - We will not be working directly on the problem set!
    - In 103, each exam is worth much more than each pset, so strategies are very important
  - Treat the problem sets like they're due on Fridays at noon
- **Supportive community!**
  - Everyone is here to learn! Share your ideas, share your questions, and be kind & considerate :D

Additional ACE resources

- **ACE-only office hours**
  - Ask me anything about the problem set or 103 material
  - Office hours times: check the website
  - Office hours location: Zoom on weekends, Huang basement with Zoom option on weekdays
- **Exam review sessions**
  - Weekends before each midterm and the final
- **One-on-one meetings** by request
  - Current plans: week 4 (after pset 1 is graded), week 6 (after midterm 1 is graded), week 9 (after midterm 2 is graded)
- **Message me on Slack** for chat-based virtual help

What you need to do to pass ACE

1. Get at least a C- in CS 103

2. Come to all the sections

   Section is where the learning happens!

   You can be absent or late up to three times
   (Please try to email me in advance, no worries if you can't)

Attendance will be taken via Slack.

About me

I’m Ryan (he/him / they/them)

- CS major (Theory) + coterm (Security)
- **My entire job is to support you!** Let me know how I can help.
- Contact me: Slack, email, office hours, before/after section
- Ask me about: anything CS 103, the CS major/coterm, section leading, baking, birdwatching

Intros!

- Pair up with someone you don’t know
- Introduce yourselves to each other:
  - Where you’re from, class year, what you’re studying
  - Something you get excited about
- Find something interesting that you have in common

Math myth-busting!

- Some people are just good at math and I’m not one of them
- Some people already know how to do this so I will never catch up
- I don’t know what’s going on and if I ask questions I’ll look silly

Math myth-busting!

- ~~Some people are just good at math and I'm not one of them~~
  Math is a skill! No one is born knowing how to write a proof, everyone has to learn and practice. You can do it!
- ~~Some people already know how to do this so I will never catch up~~
  Willingness to learn is more important to your success in this class than how much you already know
- ~~I don't know what's going on and if I ask questions I'll look silly~~
  I've been there. Please ask! We are all here to learn!
  - It's totally normal to ask "what is this even asking?" or "how do I start?"

Set Theory

Today's learning goals:

- Check whether things are elements or subsets of a set
  (You should still know the other set operations, but element and subset are important.)
- Take the power set of a set
- Better understand subset and power set relationships

Symbol	Read as	Meaning
$x \in S$	Element of	S contains x
$S \subseteq T$	Subset of	All the elements in S are also in T
$S \cup T$	Union	Set containing elements in either S or T
$S \cap T$	Intersection	Set containing elements in both S and T
$S - T$	Difference	Set containing elements in S, but not T
$S \Delta T$	Symmetric difference	Set containing elements in one but not both
$\wp(S)$	Power set	Set of all subsets of S
$\varnothing$	Empty set	Set with no elements
$\lvert S \rvert$	Cardinality	Number of elements in S

Key facts about power sets

- To find the power set of a set with sets inside, try it with one-letter names for each of the elements
- If S is a finite set, $|\wp(S)| = 2^{|S|}$
- Because $\wp(S)$ is “the set of all subsets of S”:
  - any element of $\wp(S)$ must be a subset of S
  - any subset of S must be an element of $\wp(S)$

Other set operations

For the sets S and T from problem 1, what is:

1. $S \cup T$
2. $S \cap T$
3. $S - T$
4. $T - S$
5. $S \Delta T$

Other set operations - answers

1. $\{0, 1, 2, 3, 4, 6, \{1, 2\}\}$
2. $\{1\}$
3. $\{0, 2, 3\}$
4. $\{4, 6, \{1, 2\}\}$
5. $\{0, 2, 3, 4, 6, \{1, 2\}\}$

Post-section recommendations

- Problem Set 1
  - Find a problem set partner if you don’t have one.
  - Start the problem set this weekend!
- Set theory practice:
  - Do ACE extra practice problems 1.2 and 1.4.
- Proofs practice:
  - Do the odd and even number exercises from Lecture 1. Send your proofs to me or post them on Ed.
  - We will be doing ACE problems 3-5 in section on Monday.