CS1800
Fall 2025
Recitation 7 - Practice Questions for Quiz 2
October 22 & 23, 2025

Quiz Preparation

Our second quiz is coming up on October 24th! There are two questions on the quiz, and there are practice problems for each topic below. It can also be a useful study practice to go back and revisit previous recitation practice problems on the same topics for extra practice.

Recitations

CS1802 Recitations are dedicated time set aside to work on practice problems that specifically prepare you for the current homework or upcoming quiz.

Recitations are in-person and attendance is expected.

The solutions are published at the same time as the problems, so you can check your work. There is no need to submit anything.

Approaching the Problems

These practice problems are labelled according to which Homework or Quiz topic they will help you prepare for. You do not need to complete every practice question; we encourage you to do at least one per topic, and to prioritize the topics you would like to practice.

Instructors & Teaching Assistants

Your recitation is led by a Khoury College professor, assisted by a knowledgeable and wonderful Teaching Assistant. Professors and TAs are fantastic resources, and you have the opportunity in recitation to work with them in a smaller group -- I strongly recommend you take advantage of the time to review your solutions to these practice problems, ask for help on the homework, or review material from lecture.

Practice for Set Equality (Quiz 2 Question 1)

Let our universe be all people in Boston. Suppose we the following sets:

- A -- runners in Boston
- B -- cyclists in Boston
- C -- dog lovers in Boston

Express each partition below as a set operation on A and/or B. Your solution should use the set operation symbols for intersection, union, complement, and difference, and no other symbols.

A Boston runners who also cycle

B Boston runners who don't cycle

C Boston runners who don't cycle and don't love dogs

D Boston dog lovers who run but don't cycle

E Bostonians who love dogs and running, or Bostonians who don't run but do cycle.

F Prove that your answers for Part A and Part B don't intersect by using set equality laws and/or definitions. Take one step at a time and label each step with one law.

For each pair of set expressions below, determine whether the resulting sets are equal.

- **If yes...** Apply the laws of set equality to prove that they are the same. Take one step at a time and label each step with one law.
- **If no...** give example elements for *A, B,* and *C* that would yield a counterexample. Simplify both sets to demonstrate that they are not the same.

Both *yes* and *no* answers should be clear, precise, and walk through your solution one small step at a time.

G $(A \cap B) \cup (A \cap \overline{B})$
B

H $(A \cap B) \cup (A \cap \overline{B})$
$\overline{A}$

I $(A \cap B) - (A \cup B)$

$\{\}$

J $\overline{(A \cap (A \cup \overline{\overline{B}}))}$

$\overline{A}$

Practice for Counting (Quiz 2 Question 2)

A Suppose a password system has the following restrictions:

- Must be 6-8 characters long
- At least one digit required
- Every character must be an uppercase letter or a digit

How many possible passwords are there?

B How many **bit** strings of length 9 contain exactly 4 zeroes?

C How many **decimal** strings of length 4 contain exactly 3 zeroes?

D How many integer solutions are there for the equation

$x_1 + x_2 + x_3 + x_4 = 50$

where x_1, x_2, x_3, x_4 are non-negative integers?

E How many integer solutions are there for the equation

$x_1 + x_2 + x_3 + x_4 = 50$

where x_1, x_2, x_3, x_4 are **positive** integers?

F How many integer solutions are there for the equation

$$2x_1 + 2x_2 + 2x_3 + 2x_4 = 50$$

where x_1, x_2, x_3 are non-negative integers?

G University House of Pizza on Huntington Ave. offers 8 different toppings. You want to order a pizza with 3 different toppings. How many different pizzas can you create?

H In a race with 7 runners, how many different ways can the gold, silver, and bronze medals be awarded?

I How many ways are there to roll three six-sided dice so that the sum of their values is 4? Order matters here, such that the roll (1, 1, 2) is different than (1, 2, 1).

J How many ways are there to roll three six-sided dice so that the sum of their values is 7? Order matters here, such that the roll (1, 1, 5) is different than (1, 5, 1).