

**Problem 1.** Consider the sets  $A = \{1, 2, 1, 5, 4\}$ ,  $B = \{2, 0.1, A\}$ ,  $C = \{A, B\}$ .

- (a) How many elements does each set have?
- (b) Write out  $A \cup B$ , writing each element only once (how many are there?).
- (c) Write out  $A \cap B$ , writing each element only once (how many are there?).
- (d) Is  $\emptyset$  an element of  $A$ ? Explain.
- (e) Is  $\emptyset$  a subset of  $B$ ? Explain.
- (f) Write out  $B \cup C$ , writing each element only once (how many are there?).

**Problem 2.** If  $A$  is a subset of  $B$ , could it happen that  $A$  and  $B$  have the same number of elements? Explain why or why not.

**Problem 3.** Let  $U$  be the set of classes you are taking this semester,  $A$  the classes that you are taking specifically for your major, and  $B$  the classes that include a significant amount of writing.

- (a) Write out the elements of  $U$ ,  $A$  and  $B$ .
- (b) Illustrate the sets using a Venn diagram.
- (c) Use only the symbols  $U, A, B, \sim, \cap, \cup$  to describe your general-education classes.

**Problem 4.** Suppose that for next semester you are interested in taking classes  $X$ ,  $Y$ , and  $Z$ . Suppose that there are 3 sections of  $X$ , 4 sections of  $Y$ , and five sections of  $Z$ .

- (a) If none of the sections overlap, how many options do you have for your schedule?
- (b) If one of the sections of  $X$  overlaps with one of the sections of  $Y$ , but otherwise there are no conflicts, how many options do you have for your schedule?
- (c) In each case, how many students can register for all three classes without any two having the same schedule?

**Problem 5.** As an intern in Congress, you are asked to order boxed lunch for a 10-person meeting. You have a choice of 7 types of sandwiches, 3 types of chips, and 6 types of soda. To make sure everyone gets what they want, you order 10 of each possible combination.

1. How many boxed lunches did you just order?
2. If each soda comes in normal/diet/decaf, how many boxed lunches did you order?

**Problem 6.** There are 52 cards in a standard deck.

- (a) At the beginning of a poker game, you are given two cards at random. How many starting combinations are there? (Note: you don't care what order they are in.)
- (b) During a poker game, five cards are displayed to everyone: first three at the same time (flop cards), then one more (turn card), and then one more (river card). How many flop-turn-river combinations are there?