DO NOT OPEN YOUR EXAM UNTIL TOLD TO DO SO.
You may use your class textbook, but no other materials or resources (such as class notes, old homework or a calculator). Only your exam and textbook may be out on top of your table. There is no sharing of textbooks with a friend or neighbor.
1. Some set questions:

Shade in the set \((R \cup S)' \cup (R \cap S \cap T)\).

A survey at a small Southern California college showed that 400 students jog, 150 surf and jog, and 600 surf or jog (or both). How many students surf?

If \(A \cap B = B\), then \(A \cup B = \)

\((A \cap B')' = \)
2. 100 Pepperdine students were asked what meals they eat on a typical day. Their responses:

- 60 eat breakfast
- 70 eat lunch
- 75 eat dinner
- 35 eat both breakfast and lunch
- 55 eat both lunch and dinner
- 40 eat both breakfast and dinner
- 25 eat all three meals

Draw a Venn Diagram corresponding to this information, and use it to answer the subsequent questions.

/2 How many eat only dinner (and no other meal)?
/2 How many eat a breakfast and lunch, but not dinner?
/2 How many eat breakfast or lunch (but not both), and not dinner?
/2 How many eat dinner?
/2 How many eat breakfast or dinner (or both)?
/2 How many eat just one meal per day?
/2 How many eat exactly two meals per day?
3. In answering the following questions, except where noted, do not simplify the answers. For example, leave your answer in the form \( C(5,3) \) or \( 12! \) or \( P(4,3) \cdot P(7,4) \) or \( 2^5 \) or \( 7 \cdot 6 \cdot 5 \cdot 4 \). Note: although all problems are worth the same number of points, they vary in difficulty.

A family of two parents and three girls are having their picture taken. The girls must all sit next to each other. How many ways are there to seat the family? Simplify this answer, i.e. give an actual number (and show your work).

40 people apply for 8 different positions. In how many ways can all the jobs be filled?

In how many ways can 7 people be assigned to seats in a 10 seat room? Simplify this answer, i.e. give an actual number (and show your work).

How many 10 digit phone numbers (3 for the area code and 7 for the number itself) are there if the only restriction is that 0 cannot be the first digit of either the area code or of the phone number itself?

In how many ways can a committee of 7 people be chosen from 15 married couples if the committee must consist of 4 men and 3 women?

In how many ways can a committee of 7 people be chosen from 15 married couples if a husband and wife cannot both serve on the committee (which is not necessarily 4 men and 3 women)?

In how many ways can I order a collection of 35 books on a shelf?

In how many 3-digit numbers are there in which exactly 2 digits are alike? Note: the numbers 0 through 99 are not 3-digit numbers (0 does not count as a digit in the first position).
For the following four questions, simplify your answer, i.e. give an actual number (and show your work). Suppose that you are voting on 10 propositions (so there are 2 possible votes on each proposition: either you vote for it or you vote against it). How many ways can you fill out your ballot (i.e. vote) if:

/4 You must vote on (either for or against) each proposition.

/4 You may leave any of the propositions blank.

/4 You may not vote against more than one of the propositions, that is, you must either vote for all ten of the propositions or else vote against just one of them.

/4 You must vote against 2 or more of the propositions (and you must vote either for or against each proposition).

Suppose that you are at a restaurant where there are 2 appetizers, 5 main dishes, and 3 desserts.

/4 How many different meals can be chosen if you have an appetizer, then a main dish, and then a dessert?

/4 How many different meals can be chosen if you can choose 5 items of any type (so for example you could choose 5 main dishes, or 5 desserts, or 2 main dishes and 3 deserts, etc.), where you can choose the same item more than once and the order in which you eat them doesn’t matter?

/4 Suppose you are with a friend and you each want to choose a full meal (appetizer, main dish and dessert), but you want to make sure you choose different meals. How many different meals can the two of you choose to both order a full meal but with no repetition of items?