Please work on these problems and be prepared to share your solutions with classmates in class next Friday. Assignments will **not** be collected for grading.

**Readings**

Read sections 5.1, 5.2, 5.3, 5.4, and 5.5 of *Schaum’s Outline of Discrete Mathematics*. Read section 1.7, 1.8 and 3.1 of *Discrete Mathematics Elementary and Beyond*.

**Problems**

1. Suppose a license plate contains 3 letters (from the set {A .. Z}) followed by three digits (from the set {0 .. 9}). How many different license plates can be printed?

2. Suppose a license plate contains 3 letters (from the set {A .. Z}), but no two letters can appear twice, followed by three digits (from the set {0 .. 9}), but the first of the numbers must be non-zero. How many different license plates can be printed?

3. From 100 used cars sitting on a lot, 20 are to be selected for a test designed to check safety requirements. These 20 cars will be returned to the lot, and again 20 will be selected for testing for emission standards.
   (a) In how many ways can the cars be selected for safety requirement testing?
   (b) In how many ways can the cars be selected for emission standards testing?
   (c) In how many different ways can the cars be selected for both tests?
   (d) In how many ways can the cars be selected for both tests if exactly 5 cars must be tested for safety and emission?

4. How many 0–1 strings of length 12 contain precisely 5 1s? For example 001101110000 contains precisely 5 1s.

5. Find 5!, 6!, and 7!

6. Show that \( \binom{17}{9} = \binom{16}{9} + \binom{16}{8} \) by expanding the expressions.

7. Suppose that there are 17 people trying out for a baseball team of 9 players.
   (a) Joe is clearly the best player and will certainly be chosen. How many ways are there to choose the team if we insist that Joe must be selected?
   (b) It turns out that Joe has been drafted to play in a better league. How many ways are there to choose the 9 players if Joe is no longer available?
   (c) Show that \( \binom{17}{9} = \binom{16}{8} + \binom{16}{9} \) by using the solutions to parts a) and b) above.