Work on your own paper, but staple this question sheet to the front.

Solve each problem below. Some can use simple blanks, but for others, you may find it helpful to list Step #1, Step #2, etc., as we did in class. Leave all your answers in unsimplified form, except for combining with exponents when possible.

1. Consider rearranging the letters of the word LEAVING.

   (a) How many arrangements have the L first and the G last?
   (b) How many arrangements have the vowels together?
   (c) How many arrangements have the E and the A together?
   (d) How many arrangements have the E and the A separated by at least one other letter?

2. Consider all possible 4-digit codes 0000 through 9999. Repetition is allowed, except when the question specifically restricts the digits in some way.

   (a) How many numbers do NOT repeat any digits?
   (b) How many numbers repeat at least one digit?
   (c) How many numbers use exactly one 1 and exactly one 2?
   (d) How many numbers use exactly one 1 and exactly one 2, and have those digits side-by-side somewhere, in either order?
   (e) How many numbers use exactly one 1 and exactly one 2, and do NOT have those digits side-by-side?
   (f) How many numbers use exactly one 5? (Repeated other digits are allowed.)
   (g) How many numbers use exactly two 7s? (Repeated other digits are allowed.)
   (h) How many numbers use exactly one 5 and exactly two 7s?
   (i) How many numbers use exactly one 5 or exactly two 7s?
   (j) How many use neither exactly one 5 nor exactly two 7s?