CS 161
Homework 2
Due in class - 3/30 for Chuck’s section; 3/31 for Asa’s

You must explain your answer (which counting principles are used at each step and why). Show the formulas you are using, then substitute the numbers into the formula, then calculate the answer. Hand in to your instructor before the beginning of class, and remember that we do not accept late submissions for written assignments. Please answer the questions in the given order to help us in grading.

1. How many people are needed to guarantee that at least two were born on the same day of the week and hour of the day?

2. How many ways are there to select 7 countries in the United Nations to serve on a council if 3 are selected from a block of 30, 2 are selected from a block of 55, and the rest are selected from the remaining 65 countries?

3. How many strings are there of seven lowercase letters that have the substring tr in them?

4. You’ve decided to paint your car with two-tone paint job, using one color for the top and a different color for the body. The body shop you are going to offers a special on the following colors: pink, green, orange, and eggplant. How many different paint schemes are possible using these colors? (In your answer keep in mind that this is a two-tone paint job, i.e. it uses two different colors).

5. How many license plates can be made using either three digits followed by three letters or three letters followed by three digits?

6. How many subsets of a set with 100 elements have more than one element? (i.e. at least 2 elements)

7. How many initials that contain three letters and begin with an M or an N are there? (case is not relevant here).

8. Let S and T be finite sets such that |S| > |T|, and let f : S → T be a function. Show that there exist elements s₁, s₂ ∈ S such that f(s₁) = f(s₂). This shows that f cannot be one-to-one.

9. Let n > 1 be a positive integer. How many functions f are there from the set \{1, \ldots, n\}, to the set \{0, 1\} such that:
   (a) there are no restrictions.
   (b) f assigns 0 to both 1 and n.
   (c) f assigns 1 to exactly one number between 1 and n.