Quantitative Reasoning 28:
The Magic of Numbers

Homework 2

Assigned on Fri Sept 19
Due at 12 noon, Mon Sept 22

Please submit problem sets at the end of the relevant lecture, or leave in the box labeled QR28 outside the Math Department's main office, on the third floor of the Science Center (Room 325).

Reading:

Gross-Harris, Chapter 2

Problems:

Please explain your reasoning and show your work.

1. Jesse goes out to dinner at Dali to celebrate the fact that he's not teaching calculus this year. On the menu are listed four possible seafood tapas and five possible vegetarian tapas. How many ways are there for Jesse to order if he intends to get a seafood dish, a vegetarian dish, and either lemonade or water to wash it down?

2. How many 4 digit numbers are there using the digits 0, 1, 2, 3, 4, 5 and 6? Be careful: the first digit can't be zero! How many of these are even?

3. How many license plates are there of the form 3 letters, then 3 numbers? What if we restrict the 3 numbers, considered as a 3-digit number, to be between 387 and 971, inclusive? What if we also require that the letters not include the letter "Q" on the grounds that it looks too much like an "O"?

4. By tricolor flag we shall mean a flag composed of three equal vertical bands of color (like the French one, or the one of Côte d'Ivoire). If we allow ourselves the colors blue, green, orange, red, yellow, and white, how many flags can we make? (We allow neighboring bands to have the same color).

   Suppose we want to save money on dye by requiring that *at least one* of the bands is white - how many flags can we make then? (Hint: First figure out how many of the flags have *no* bands being white and then use this to answer the question. This is an example of the *subtraction principle* which we shall learn about in the next lecture).