CS182 – Foundations of Computer Science

**Homework 6 (100 points)**

**Due:** Thursday, April 9, 2020, 11:59pm

**Upload the homework to Gradescope. DO NOT SUBMIT TO BLACKBOARD LEARN.** No late submissions accepted. Only typed solutions will be graded.

**Problem 1. (100 = 10*10 points)**
In this problem, a word is any string of 12 numbers (e.g., 002342393765 is a codeword but 01245 is not, since it consists of only five numbers).

Provide a *brief* justification for each of your answers (no more than five lines or so), explaining which counting rules you used and what your thought process was. Feel free to give expressions in the form $2 \cdot 4^{10}$, etc. in your final answers; no need to use calculators to compute such powers.

1. How many codewords are there?
2. How many codewords end with 45?
3. How many codewords begin with 1 and end with 1?
4. How many codewords begin with 52 or 62?
5. How many codewords begin with 00 or end with 00?
6. How many codewords begin with 22 or 12 and end with 0 or 1?
7. How many codewords begin with a number strictly smaller than 5 and end with a number strictly larger than 5?
8. How many codewords have their first three numbers be all strictly smaller than 6? For example, 03242393765 and 01342393765 are such codewords but 02742393765 is not.
9. How many codewords have no zeros *and* no ones *and* no twos?
10. How many codewords have no ones *or* no fives?