

# Math 184A Homework 4

Fall 2016

This homework is due on gradescope by Friday November 4th at 11:59pm. Remember to justify your work even if the problem does not explicitly say so. Writing your solutions in L<sup>A</sup>T<sub>E</sub>X is recommended though not required.

**Question 1** (Stirling Number Computation, 20 points). *Compute the values of  $c(n, k)$  for all  $1 \leq k \leq n \leq 6$ .*

**Question 2** (Multiple of 3 Cycles, 20 points). *Show that the number of permutations of  $[3m]$  for which all cycles have lengths which are multiples of 3 is*

$$(3m-1)(3m-2)^2(3m-4)(3m-5)^2 \cdots 2 \cdot 1^2.$$

**Question 3** (Two Set Inclusion-Exclusion, 20 points). *For sets  $A, B, C$  show that the number of elements of at least two of these sets is*

$$|A \cap B| + |A \cap C| + |B \cap C| - 2|A \cap B \cap C|.$$

**Question 4** (Word Counting, 40 points). *How many 5-letter words have exactly two vowels (vowels are ‘a’, ‘e’, ‘i’, ‘o’, and ‘u’ again), OR have all their letters distinct, OR have their letters appearing in alphabetical order? For example, you should count “abuzz” (two vowels and in increasing order), “alike” (all letters distinct), “aaaaa” (letters in alphabetical order), but not things like “issue”.*

**Question 5** (Extra credit, 1 point). *Approximately how much time did you spend working on this homework?*