# COP 3502 Suggested Program Edits: Recursion, Brute Force (Week 4 Programs)

1) Edit the Water program so that not only does it count the bodies of water, but it also calculates the number of squares in each body of water and prints these out as each individual floodfill is done. (Thus, these prints will occur before the print of the number of regions.)

2) Challenge Problem: Edit the permutation algorithm so that if the objects that are being permutated are repeated, multiple permutations with the repeated objects swapped are not printed. For example, edit the algorithm so that when printing all permutations of "MEME", only six things print: "EEMM", "EMEM", "EMME", "MEEM", "MEME" and "MMEE", instead of 24 (four copies of each of these).

3) Edit max jumps so that instead of taking calculating the max jumps in a permutation of 0, 1, 2, …, n-1, that the input is a set of n positive integers in between 1 and 100. So, for example, if the input is 12, 9, 6 and 22, then the program should discover that the sequence 6, 22, 9, 12 has a jumping distance of 32 ( $|6 - 22| + |22 - 9| + |9 - 12| = 16 + 13 + 3 = 32$.), which is the maximum possible of any permutation of 12, 9, 6 and 22.

4) Edit the derangements program so that for each slot i, the value stored there has to differ from i by at least 2. For example, for n = 4, we could have 2, 3, 0, 1, since $|0 - 2| = 2$, $|1 - 3| = 2$, $|2 - 0| = 2$ and $|3 - 1| = 2$. This should result in fewer permutations being printed than the regular derangement program.

5) Edit the upwards function so that instead of printing upwards, it prints downwards (words where each letter is in descending alphabetical order.)