SPRING 2017: COT 5407 Intro. to Algorithms
[Homework 2; Due Jan 26 via Email]

General submission guidelines and policies: Add the following signed statement. Without this statement, your homework will not be graded.

I HAVE ADHERED TO THE COLLABORATION POLICY FOR THIS CLASS. IN OTHER WORDS, EVERYTHING WRITTEN DOWN IN THIS SUBMISSION IS MY OWN WORK. FOR PROBLEMS WHERE I RECEIVED ANY HELP, I HAVE CITED THE SOURCE, AND/OR NAMED THE COLLABORATOR.

Read the handout on Homework guidelines and collaboration policy from your course website before you start on this homework. This is very important.
You only need to submit solutions to problems marked (Regular). All others are optional.

Problems

5. (Regular) Solve and submit any one problem from Exercises 3-2 on p61.

6. (Exercise) Solve as many problems as possible from Exercises 3-2 and 3-3(a) on p61.

7. (Exercise) Solve and submit any one of the four problems in Exercise 4.5-1 on p96.

8. (Exercise) Solve remaining problems from Exercise 4.5-1 (a)-(d) on p96 using the master theorem.

9. (Exercise) Solve Exercise 4.5-3 on p96 using the master theorem. Make sure you are able to explain how you got the recurrence in the first place.

10. (Exercise) Explain in a couple of sentences why the correct recurrence for INSERTIONSORT is

\[ T(N) \leq T(N - 1) + O(N) \]

HINT: Consider the last iteration.

11. (Regular) Solve any four problems from Exercises 4-1 and 4-3 on p107-108.

12. (Exercise) Solve the remaining problems from Exercises 4-1 and 4-3 on p107-108.

13. (Extra Credit) You are given a \( N \times N \) matrix of integers where each row and each column is strictly increasing. Design an efficient search algorithm to determine if the matrix contains a given value \( x \). More importantly, analyze your algorithm. Since this is an extra credit problem, unless the algorithm is the most efficient possible, I cannot give you any credit for your solution.