FALL 2019: COT 6405 ANALYSIS OF ALGORITHMS
[Homework 2; Due Sep 17 by 11:59 PM via Canvas]

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

9. (Regular) Solve and submit one problem from Exercises 3-2 on p61, where \( A = O(B) \). Prove your answer.

9. (Regular) Solve and submit one problem from Exercises 3-2 on p61, where \( A \neq O(B) \). Prove your answer.

10. (Regular) Solve and submit any one of the problems in Exercise 4-1 on p107 by applying the Master Theorem.

11. (Exercise) Write down an invariance for the sorting algorithms discussed in class.

12. (Regular) Prove one of the invariances from above using mathematical induction.

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.