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.