CS2022/MA2201
HW#3

DUE: Friday, September 12

1. (4 points) Do **Exercise 1.8.8** from our text.

2. (4 points) Do **Exercise 1.8.16** from our text.

3. (5 points) Prove or give a counterexample to the following conjecture. If you give a counterexample, you must prove that it's a counterexample.

CONJECTURE: For all functions $f,g:\boldsymbol{R}\rightarrow\boldsymbol{R}$, if $f(x)$ is $O(g(x))$, then $g(x)$ is $O(f(x))$.

4. (4 points) Is it true that $\sum_{k=0}^{n} k$ is $O(n^2)$? Justify your response.

5. (4 points) Consider the algorithm to multiply two n-digit numbers together that you learned in grade school.
   - Give a tight bound, using O-notation, of the time complexity of your algorithm.
   - If, using your algorithm, you can multiply together two 20-digit numbers in σ seconds, then how long do you expect it to take you to multiply together two 60-digit numbers?