CS2022/MA2201
HW#4

DUE: Friday, September 17

1. (4 points) Do **Exercise 1.8.4** of our text.

2. (4 points) Do **Exercise 1.8.10** of our text.

3. (5 points) Prove or give a counterexample to the following
CONJECTURE: For any $f:\Re\to\Re$, $g:\Re\to\Re$, if $(\forall n)\, f(n)\le g(n)$, then $f(n)+g(n)$ is $O(g(n))$.

4. (7 points) You are given a set of 27 gold coins, 26 coins are identical and one is lighter than the others. You are also given a balance (a scale with two pans and an indicator telling whether the object(s) in the left pan are lighter than, heavier than, or the same weight as the object(s) in the right pan). Since you must pay me for each use of the scale, you'd like to identify the light coin in as few weighings as possible.

- Describe an algorithm which uses as the scale as few times as possible in the worst case.
- How many times does your algorithm use the scale in the worst case?

5. (5 points) Do **Exercise 3.1.8**, parts (*a*), (*b*), (*c*), (*d*) and (*f*) from our text. Make sure to draw all possible relevant conclusions.

6. (4 points) Do **Exercise 3.1.20** from our text.