MATH 201 HW 12 - Chapter 1.1–1.3, 2.1 from Basic analysis

due **Apr 15** before class.

Staple all your papers. Write carefully, unreadable answers will not receive any credit. Write your opinion about every question - good - bad - ugly - (or some other) and difficulty.

Please write your section or time of your class on you HW.

1: *1.1.5* Let S be an ordered set. Let $A \subset S$ and suppose b is an upper bound for A. Suppose $b \in A$. Show that $b = \sup A$.
(This question is: good - bad - ugly? Difficulty 0-9:)

2: *1.1.6* Let S be an ordered set. Let $A \subset S$ be a nonempty subset that is bounded above. Suppose $\sup A$ exists and $\sup A \notin A$. Show that A contains a countably infinite subset. In particular, A is infinite.
(This question is: good - bad - ugly? Difficulty 0-9:)

3: *1.2.9* Let A and B be two nonempty bounded sets of real numbers. Let $C = \{a + b : a \in A, b \in B\}$. Show that C is a bounded set and that

$$\sup C = \sup A + \sup B \text{ and } \inf C = \inf A + \inf B.$$

(This question is: good - bad - ugly? Difficulty 0-9:)

4: *1.3.1* Show that $|x - y| < \varepsilon$ if and only if $x - \varepsilon < y < x + \varepsilon$.
(This question is: good - bad - ugly? Difficulty 0-9:)

5: *1.3.3* Find a number M such that $|x^3 - x^2 + 8x| \leq M$ for all $-2 \leq x \leq 10$. Note that we are not asking for the smallest M, any M will do.
(This question is: good - bad - ugly? Difficulty 0-9:)

6: *2.1.5* Find the limit of the sequence $\frac{n}{n+1}$ and prove from the definition of limit that your solution is correct. (i.e. you can use whatever you know for finding the limit, but then you need to use the definition 2.1.2 to prove that you indeed found the limit.)
(This question is: good - bad - ugly? Difficulty 0-9:)

7: *2.1.14* Find a convergent subsequence of the sequence $\{(-1)^n\}$.
(This question is: good - bad - ugly? Difficulty 0-9:)