Math 141, Problem Set #3
(due **in class** Fri., 9/27/13)

Stewart, section 1.3, problems 24, 32, 44, 46. (Note: For problem 1.3.24, you don't need to find ALL δ's that work, or even the largest δ that works; it's enough to find ONE δ that works, so just find one that's easy to compute with!) Note that for Problem 46, you must appeal directly to Definition 4 (and not, say, Theorem 3).
Stewart, section 1.4, problems 2, 8, 12, 16, 24, 30, 32, 34, 44.

Also:

A. Prove that $|ab| = |a||b|$ for all real numbers a, b.

B. Consider the function

$$f(x) = \begin{cases} 1 & \text{if } x \text{ is rational} \\ -1 & \text{if } x \text{ is irrational} \end{cases}.$$

   (a) What is $\lim_{x \to 0} f(x)$?

   (b) What is $\lim_{x \to 0} x f(x)$?

C. Prove or disprove the proposition "If $\lim_{x \to a} [f(x)]^2 = r^2$, then either $\lim_{x \to a} f(x) = r$ or $\lim_{x \to a} f(x) = -r$." That is, decide whether you believe this proposition is true for every proposition f or there are exceptions, and then justify your belief with either a deduction (if the proposition is true) or a counterexample (if the proposition is false).

D. Prove $\lim_{x \to 0} x^2 \sin 1/x = 0$.

Please don't forget to write down on your assignment **who you worked on the assignment with** (if nobody, then write "I worked alone"), and write down on your time-sheet **how many minutes you spent on each problem** (this doesn't need to be exact).