Homework to be done by October 21th

Section 4.1: Problems 13, 14, 18, 21, 22, 40.
Section 4.2: Problems 6, 16, 25, 47, 48.
Section 4.3: Problems 34, 40.
Section 4.4: Problems 7, 19, 38.
Section 4.6: Problems 29, 30.
Section 4.8: Problems 3, 6, 20, 23, 25, 33, 41, 55.

Important Note: The point of the problems in Section 4.8 is not to draw beautifully accurate graphs but to have you practice translating analytic information (formulas) into geometric information (pictures). Hence, to do thins in the proper spirit, you should do this problems *without* using a calculator. *After* you have sketched your graph, you can check your answer with a graphing calculator if you want. The same principle applies to the hand-in problems below.
Given the fact that the midterm would be on Wednesday October 20th, it would be good idea to look at the homework in detail before hand.

Problems to be handed in on October 21th

1. Suppose that for all $x \geq 0$, $f'(x)$ exists and satisfies $a \leq f'(x) \leq b$. Show that for all $x > 0$

$$f(0) + ax \leq f(x) \leq f(0) + bx.$$

2. Let

$$f(x) = \frac{x^3 - 3x^2}{x + 1}.$$

2.1 Find the domain of definition of f.
2.2 Find the critical points and the intervals on which f is increasing and decreasing.
2.3 Find the inflection points and the intervals on which f is concave up and concave down. (Hint: You can solve the equation $f''(x) = 0$ by "completing the cube".)
2.4 Compile all the information on a table.
2.5 Sketch the graph of f, incorporating the information above (see note above).