Name: _____   **Discussion Section Number:** _____

Homework 6 — Due 11/15/2010 in class

This cover sheet must be attached as the top page of your homework.

1. Given the following function:
$$f(x) = x^4 - 4x^3 + 10$$

   (a) Find where all extrema (relative max or mins) of f occur.

   (b) Determine the intervals on which f is increasing and intervals on which it is decreasing.

   (c) Find where the graph of f is concave up and where it is concave down.

   (d) Plot the following specific points: local maximum or minimum points, points of inflection, and   the   y-intercept.
   Using these points and your information from (a) - (c), sketch a graph of f.

2. Given the following function:
$$f(x) = \frac{(x+1)^2}{1+x^2}$$

   (a) Determine the domain of $f(x)$.

   (b) Find $f'(x)$ and $f''(x)$. (You are welcome to use something like *wolframalpha.com* to do or to check these derivatives.)

   (c) Find critical points of $f(x)$ and determine relative maximum and minimum points.

   (d) Find where $f(x)$ is increasing or decreasing, where it is concave up or concave down, and inflection points.

   (e) Find any vertical or horizontal asymptotes.

   (f) Plot a few specific points such as relative max or mins, inflection points, and the y-intercept.
   Sketch a graph of $f(x)$ incorporating the information from (a) through (e).

3. Find the volume of the largest right circular cone that can be inscribed in a sphere of radius 3.

4. You are 2 miles offshore in a boat and wish to reach a person who is 6 miles down a straight shoreline from the point nearest the boat. You can row 2 miles per hour and you can walk 5 miles per hour. Where on the shoreline should you land your boat to reach the person in the least amount of time?