Homework 5
Due Monday 3/28/2011 in class

Name: **Section Number:**

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

1. Let $g(x) = 3x^3 + 2x - 6$. Find a function $f(x)$ with $f'(x) = g'(x)$ and $f(1) = 8$.
2. Given the function $f(x) = x^3 - 12x - 5$
   (a) Find all critical points of $f(x)$.
   (b) Identify intervals on which $f(x)$ is increasing and decreasing.
   (c) Find the relative extreme values of $f(x)$.
   (d) Find the absolute extrema of $f(x)$ on the interval $[0, 4]$.
3. Given the function $f(x) = 4x^3 - x^4$
   (a) Find all critical points of $f(x)$
   (b) Identify intervals on which $f(x)$ is increasing and decreasing.
   (c) Find the relative extreme values of $f(x)$.
   (d) Find any inflection points of $f(x)$.
   (e) Sketch a graph of $f(x)$ clearly indicating the information found in (a) through (d).
4. Given the function $f(x) = 2x - 3x^{2/3}$
   (a) Find all critical points of $f(x)$.
   (b) Identify intervals on which $f(x)$ is increasing and decreasing.
   (c) Find the relative extreme values of $f(x)$.
   (d) Find any inflection points of $f(x)$.
   (e) Find any vertical tangents or cusps.
   (f) Sketch a graph of $f(x)$ clearly indicating the informations from (a) through (e).
5. Given the 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 a tool like wolframalpha.com to do or check these derivatives.)
   (c) Find all critical points of $f(x)$ and determine relative maxima and minima.
   (d) Find where $f(x)$ is increasing or decreasing, where it is concave up and concave down, and any inflection points.
   (e) Find any vertical or horizontal asymptotes.
   (f) Sketch a graph of $f(x)$ clearly indicating the information from (a) through (e).