Practice Midterm #1

Name:

StudentID:

Major:

Time: 60 minutes.

Date: Tuesday, 8$^{\text{th}}$ February 2011.

Justify your solutions and show all your steps. Write down the formulae used.

Number	1	2	3	4	5	$\sum$
Possible Points	12	12	5	5	6	40
Points						

1. Let $f(x) = x^4 + 4\frac{1}{2}x^3 + 3x^2 - 10x - 12$. Let G_f be its graph. The goal is to sketch the graph.

    (a) Find the first three derivatives of the function.

    (b) Find the y-intercepts and the x-intercepte (zeros).

    (c) Find the zeros of the first derivative.

    (d) Use this to find critical points. Determine if they are maxima or minima or neither.

    (e) Determine where the graph is increasing and where decreasing.

    (f) Find the zeros of the second derivative.

    (g) Use this to find possible inflection points. Use the third derivative to make sure you really found an inflection point.

    (h) Determine by using the first derivative if it's a saddle point.

    (i) Use your information to graph the function.

2. Do the same for the function

$$f(x) = \frac{5x - 15}{x + 2}$$

   taking asymptotes into account.

3. Find the derivative of
$$y = \frac{1 + e^{-x}}{1 - e^{-x}}$$

and of
$$y = \ln(x^{12} - 2x^4 + 5).$$

4. Find the slope of the tangent at $(1, -1)$ to the curve
$$x^2 + 4x + y^2 + 2y - 4 = 0.$$

5. The volume of a cube is increasing at a rate of $64cm^3/sec$. At what rate is the length of each edge of the cube changing when the edges are 6 cm long?