CAMOSUN COLLEGE

Mathematics 100 Test #2A **Name:** _____

Instructor: George Ballinger **Section:** _____
Term: Fall, 2011

The Sharp EL-531 calculator may be used on this test.
You may not use L'Hôpital's Rule when evaluating limits.
Show all of your work in the space provided.
The number of marks for each question is indicated in brackets.

Mark: $\overline{25}$

1. Find the limit and show your work. If the limit does not exist, then answer ∞ or $-\infty$ if applicable.

$$\lim_{x\to-\infty}\frac{8x^2+7-2x^3+11x}{x-7x^3+x^2-3}$$

[2]

2. Use implicit differentiation to find $\frac{dy}{dx}$ for the following curve and simplify your answer.

$$2x^3+10xy^2-7x^2=5y^4+13$$

[3]

3. If Newton's Method were used to approximate a zero of $f(x)=x^3+3x^2+1$ using an initial approximation of $x_1=-3$, then compute the next approximation x_2.

[2]

4. Consider the function $f(x) = \dfrac{-3x^2+3}{x^2+1}$. Its first two derivatives are $f'(x) = \dfrac{-12x}{(x^2+1)^2}$ and $f''(x) = \dfrac{12(3x^2-1)}{(x^2+1)^3}$.

(a) Find the coordinates of all x and y-intercepts and the equations of all asymptotes.

[2]

(b) Find the intervals on which f is increasing or decreasing and find the coordinates of all critical points. Classify each critical point as a relative maximum, relative minimum or neither.

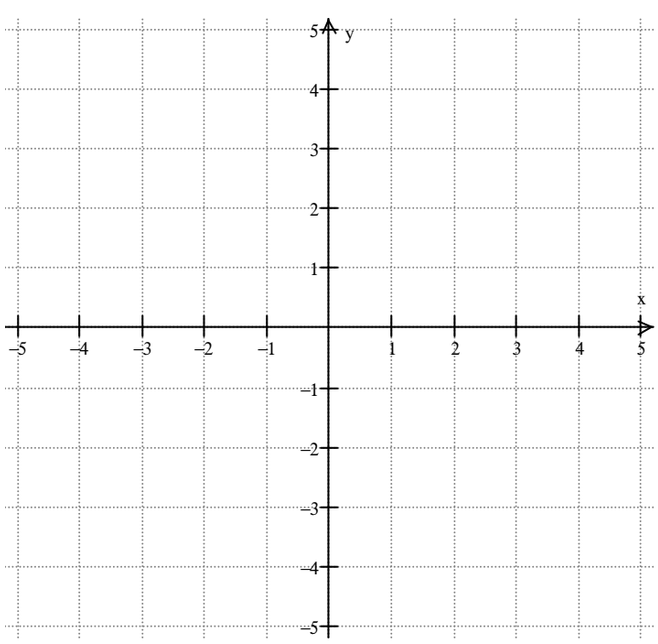
[2]

(c) Find the intervals on which the graph of f is concave upward or concave downward and find the coordinates of all inflection points.

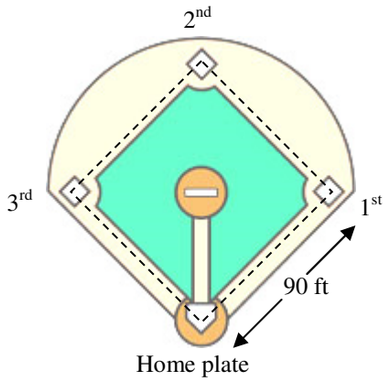
[2]

(d) Use the above information and possibly extra points to sketch the graph of the function. Clearly label **all** intercepts, asymptotes, critical points and inflection points on your graph.

[2]



5. A baseball diamond is a square with side 90 ft. A batter hits the ball and runs from home plate toward first base with a speed of 24 ft/sec. At what rate is his distance from third base increasing when he is halfway to first base? Round your answer to three decimal places.



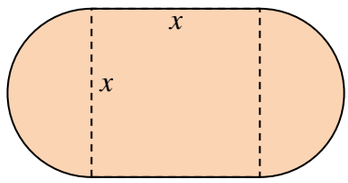
[4]

6. Let $g(\theta) = 2\theta + 4\cos\theta$. Find the absolute minimum and maximum values of g on the interval $[0, 2\pi]$. Round your answers to three decimal places.

[3]

7. An ice rink is in the shape of a square with a semicircle on opposite ends as shown in the figure.

(a) Express the area A of the ice rink as a function of its width x and simplify.



[1]

(b) If the width of the ice rink is measured to be 85 ft with a possible error of 0.5ft, then using **differentials** approximate the possible propagated error in calculating the area of the ice rink. Round your answer to one decimal place.

[2]