

Name: _____ PID: _____

TA: _____ Sec. No: _____ Sec. Time: _____

Math 20A
Midterm Exam 2 V1
November 20, 2008

Turn off and put away your cell phone.

No calculators or any other electronic devices are allowed during this exam.

You may use one page of notes, but no books or other assistance during this exam.

Read each question carefully, and answer each question completely.

Show all of your work; no credit will be given for unsupported answers.

Write your solutions clearly and legibly; no credit will be given for illegible solutions.

If any question is not clear, ask for clarification.

1. (6 points) Suppose y is defined implicitly by the equation $y^2 = x^3 - 3x + 1$. Find the derivative y' at the point $(-1, \sqrt{3})$ on the graph of the equation.

#	Points	Score
1	6	
2	15	
3	6	
4	6	
5	6	
Σ	39	

2. (15 points) Let $g(x) = x e^{-2x^2}$ Then,

$$g'(x) = (1 - 4x^2)e^{-2x^2}$$

$$g''(x) = 4x(4x^2 - 3)e^{-2x^2}$$

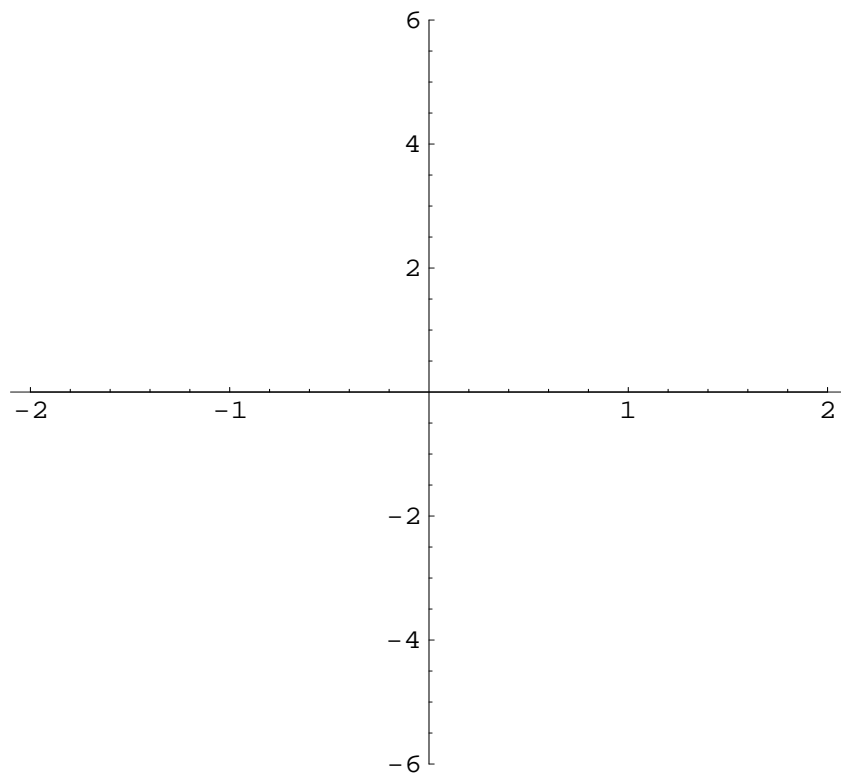
(a) Find the intervals on which g is increasing and decreasing.

(b) Find the local maxima and local minima of g and the points where they occur.

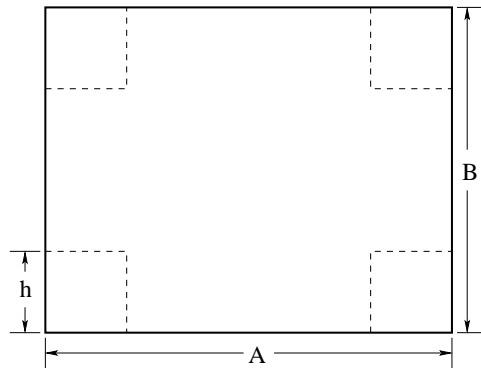
(c) Find the absolute maximum and absolute minimum of g over the interval $[-2, 2]$ and the points where they occur.

2. (d) Find the intervals on which the graph of g is concave up and concave down and find the inflection points.

- (e) Use the information above to sketch the graph of g . Be sure to clearly label each important point, specifying its coordinates and what type of point (e.g., inflection point) it is.



3. (6 points) A box (with no top) is to be constructed from a piece of cardboard of sides A and B by cutting out squares of length h from the corners and folding up the sides. Which value of h maximizes the volume of the box if $A = 2B$?



4. (6 points) Find a linear approximation for $\sqrt{406}$.

5. (6 points) Suppose $f(x)$ is a differentiable function, $f(0) = 4$ and $f'(x) \leq 2$ for $x > 0$. Use the Mean Value Theorem on the interval $[0, 4]$ to show that $f(4) \leq 12$.