Math 614 Take-Home Assignment
Due: Monday, April 20, 2009
Name_____

Directions: Read each exercise carefully. Show all work to arrive at a correct answer. Do your work on other sheets of paper, and work each exercise in chronological order. Write legibly as I cannot grade what I cannot read. You may only collaborate with students in this class should you choose to do so. You may not seek assistance from any person outside this class. You may, however, use additional resources, but only in the form of textbooks or the Internet. It is your responsibility to ensure that the information used from either the Internet or textbooks is accurate.

1) Let $f(x) = \frac{4}{x}$.

(A) Use the definition of the derivative to calculate the derivative of f.

(B) Find the slope of the tangent line to the graph of f at the point $(-2, -2)$.

(C) Write an equation of the tangent line in part (B).

(D) Sketch the graphs of f and the tangent line on the same axes. Use a graphing grid or graphing paper (that you can download online).

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2) Differentiate and simplify.

(A) $y = 4x^5 - 5x^3 + \sqrt[2]{x^3}$

(B) $G(x) = \frac{x^2 - 1}{x^2 + 1}$

(C) $f(x) = 7^x \cdot 4^x$

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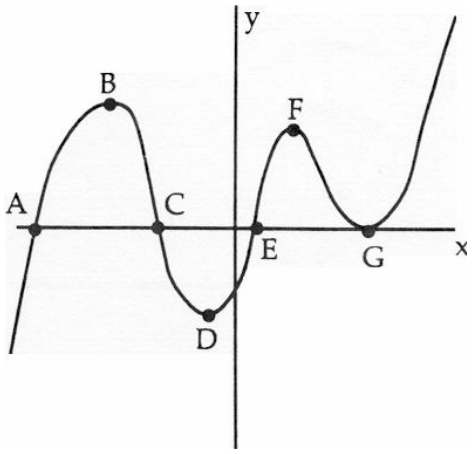
3) Given the graph of $f'(x)$ below. Use lowercase letters to indicate the x-coordinates of the labeled points.

(A) Explain what is happening on the graph of f at each of the labeled points.

(B) On what interval(s) is f increasing? decreasing? Why?



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4) A position equation for the movement of a particle is given by $s = (t^3 + 1)^2$ where s is measured in feet and t is measured in seconds. Find the velocity of this particle at 1 second.

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5) Determine the point(s) at which the graph of the function f given by $f(x) = \frac{x - 4}{x^2 - 7}$ has a horizontal tangent line.