Math 1351-008 | Exam II-B | March 5, 2007

Makeup

Due: Wed. Mar 7, 5:00 pm, MA 201

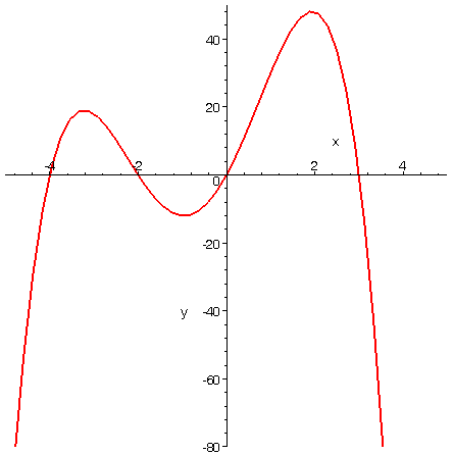
Answer the problems on **separate** paper. You do <u>not</u> need to rewrite the problem statements on your answer sheets. Do your own work. Show **all relevant steps** which lead to your solutions. Attach this question sheet to the <u>front</u> of your answer sheets.

1. (6pts) Solve (algebraically) the equation:

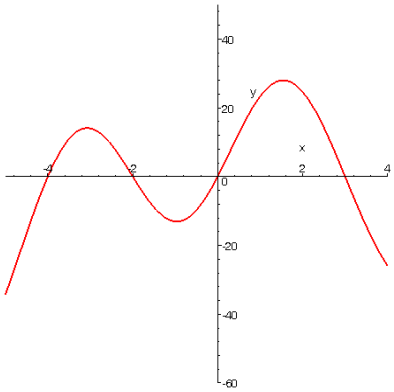
$$\log_8 x + \log_8 (x-2) = 1$$

2. (6pts) <u>Using the definition</u>, find the derivative of $f(x) = 3x^2 - 2x$.

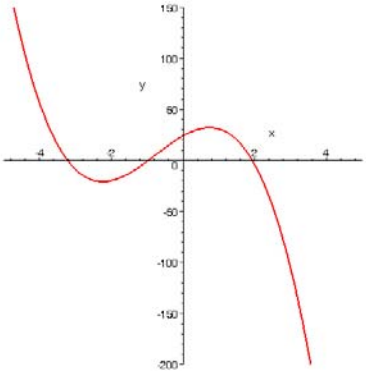
3. (4pts) The graph of $y = f(x)$ is given in the figure to the right. Which of the figures below best represents the graph of $y' = f'(x)$ (short answer).



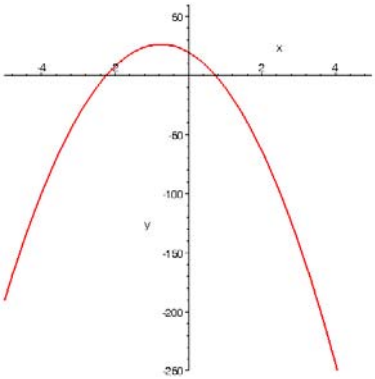
a



b



c



4. (48pts) Using the rules of differentiation, find the first derivative of each of the following functions. Simply the results, where appropriate. Write the final form of each of the derivatives <u>using positive exponents only</u>.

a. $a(x) = 4x^6 + 14\sqrt{x} - \dfrac{5}{x^3}$

b. $b(x) = \dfrac{4x^2 - 3}{x^2 + 2x}$

c. $c(x) = xe^{-4x} - e^{-2x}$

d. $d(x) = \tan^{-1} x^2 - \tan 2x^2$

e. $e(x) = \ln\sqrt{x^2 + 4x}$

f. $f(x) = x^3(2x+3)^4$

5. (8pts) Find y' for the following implicitly defined function:

. $x^2 + 4xy^2 - y^3 = 3x + 1$

6. (9pts) For each of the following functions, find the 10th derivative, i.e., find $y^{(10)}$ (find $\dfrac{d^{10}y}{dx^{10}}$):

a. $y = \sin x$ b. $y = e^{2x}$ c. $y = 17x^6 - 8x^5 - 11x^4 + 9x^2 - 5x + 3$

7. (6pts) Let $f(x) = 2x - \dfrac{x+2}{x^2+1}$. Find the equation of the tangent line to the graph of $y = f(x)$ at $x = 2$.

8. (8pts) Let $s(t) = 2t^2 - 6t + 2, \quad 1 \le t \le 4,$ give the position of a moving body. Describe the motion of the body, i.e.,

a. tell when the body is advancing
b. tell when the body is retreating
c. find the total distance the body travels.

9. (8pts) A truck leaves Denver at noon and heads due south for Santa Fe, traveling at 60 mph. A car (student driver) leaves Denver at 1:00 pm and heads due east for Kansas City, traveling at 75 mph. At 5:00 pm they are both the same distance from Denver. At 5:00 pm, how fast is the distance between the two vehicles increasing?