

**Math 151**  
**Exam 2**  
**November 21st, 2008**

Name: \_\_\_\_\_

1. Your exam contains 4 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values vary and these are indicated on each problem. You have 50 minutes for this exam.
3. Make sure to **ALWAYS SHOW YOUR WORK**; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification. **Note:** To evaluate limits, proof by graph or table of values does not suffice for full credit.
4. If you need extra space, use the back of the exam and clearly indicate this.
5. You are allowed one  $8.5 \times 11$  sheet of handwritten notes (both sides) and a basic or scientific calculator. (No graphing calculators.)
6. Leave answers in exact form (as simplified as possible).
7. Put a box around your final answer where applicable.

Problem	Total Points	Score
1	48	
2	16	
3	16	
4	20	
Total	100	

1. (48 pts.) Find the following. You do **not** need to simplify your answers.

(a) (10 pts.)  $\frac{d}{dt}[3 \arctan(2^t) \cdot \sqrt[4]{t}] = ?$

(b) (10 pts.) If  $g(x) = \frac{8-3x^2}{\ln(x^3+4x)}$ , what is  $g'(x)$ ?

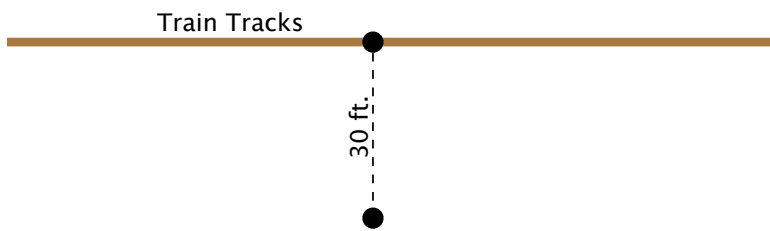
(c) (12 pts.) Find the **second** derivative of  $f(x) = \cos^2(4x)$ .

(d) (8 pts.) Find the 80th derivative of  $F(x) = 2e^x + 6x^{50}$ .

(e) (8 pts.)  $\lim_{\theta \rightarrow 0} \frac{1 - \sec \theta}{\cos \theta - 1}$

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2. (16 pts.) You are having a picnic near some train tracks from which you are 30 feet away (measured from the point closest to you on the tracks).

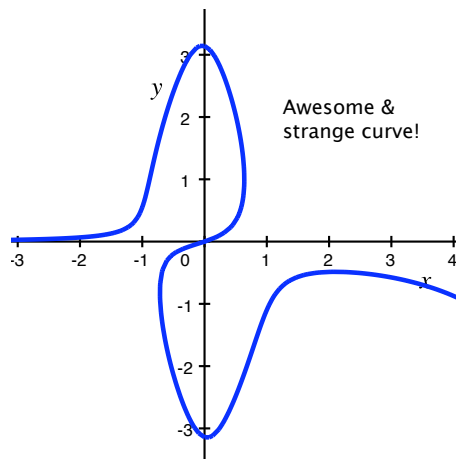
If a train is traveling at a speed of 35 feet/second and has already passed the point closest to you, how fast is the **distance between you and the train increasing** when the train is 50 feet away from you?



Include units in your answer.

3. (16 pts.) Consider the curve  $e^x + 4x^2y = 3\sin(y) + 1$ , which is shown below because it is cool.

(a) (10 pts.) Find  $\frac{dy}{dx}$  using implicit differentiation.



(b) (6 pts.) Find an equation of the tangent line to the curve at the point (0,0).

4. (20 pts.) The velocity of my pet tortoise Sam as he moves along a straight line is given by the function

$$v = \frac{t^2}{4} - 3t \quad (\text{in inches/min}) \text{ at } t \text{ minutes with } t \geq 0.$$

(a) (9 pts.) When is Sam at rest? When is Sam moving in the negative direction?

At Rest: \_\_\_\_\_

Moving in the  
Neg. Direction: \_\_\_\_\_

(b) (6 pts.) Find Sam's acceleration at time  $t$ .

(c) (5 pts.) Is Sam speeding up or slowing down at the time  $t = 4$  minutes? (Show work or explain.)