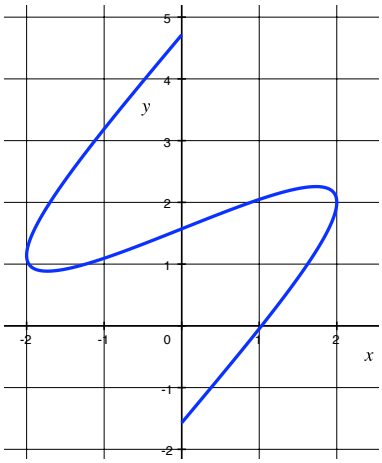
Math 124
Exam 3
June 1st, 2007

Name: _____

1. Your exam contains 5 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values for problems vary and these are clearly indicated. 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.
4. If you need extra space, use an extra sheet attached to the back of the exam and clearly indicate this.
5. You are allowed one 8.5×11 sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

Problem	Total Points	Score
1	20	
2	20	
3	25	
4	15	
5	20	
Total	100	

1. (20 pts.) The curve below is described by the equations $x(t) = 2\cos(t)$ for $-\frac{\pi}{2} \leq t \leq \frac{3\pi}{2}$.
$y(t) = t + 2\cos(t)$



(a) (10 pts.) Find an equation of the tangent line to the curve at the point at which $t = \pi$.

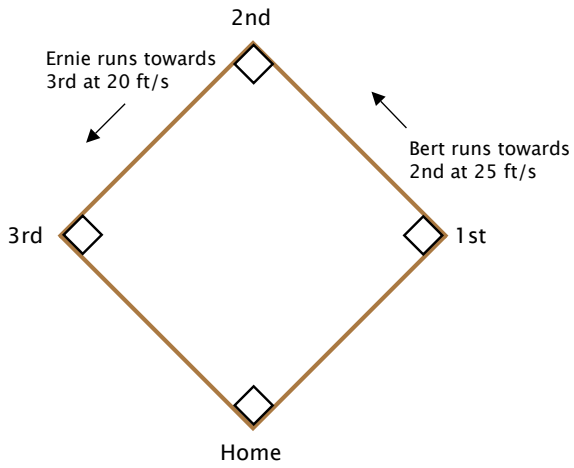
(b) (10 pts.) Find the **values of t** at which the tangent line of the curve is horizontal.

2. (20 pts.) $f(x) = 3x^{2/3}(x + 15)$

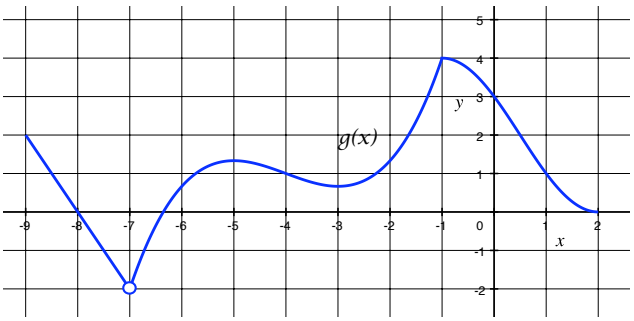
(a) (12 pts.) Find the critical numbers of f on the interval $[-15, 1]$.

(b) (8 pts.) Find the absolute maximum and minimum **values** of f on the interval $[-15, 1]$.

3. (25 pts.) Bert is on first base and Ernie is on second base during a baseball game. When the batter hits the ball, Bert and Ernie simultaneously start running towards the next bases. Bert runs at a speed of 25 feet/second and Ernie runs at a speed of 20 feet/second. How fast is the distance between them changing when Bert has run 50 feet and Ernie has run 40 feet? Is the distance between them increasing or decreasing? (Recall: The sides of a baseball diamond are 90 feet in length.)



4. (15 pts.) The graph of $g(x)$ on the interval $[-9, 2]$ is given below.



(a) (5 pts.) Identify the critical numbers of g in the domain.

(b) (5 pts.) State the absolute maximum and minimum **values** of $g(x)$ (if any).

(c) (5 pts.) State the **x-values** at which $g(x)$ has a local maximum and minimum.

5. (20 pts.) Find the linearization at $x = 1$ of $h(x) = 4\arctan(x^2) - \frac{\ln(x)}{x}$ and use it to approximate $h(1.01)$.