Math 141, Exam 2, Fall 2005

Write your answers as legibly as you can on the blank sheets of paper provided. Use only **one side** of each sheet. Be sure to number your pages. Put your solution to problem 1 first, and then your solution to number 2, etc.; although, by using enough paper, you can do the problems in any order that suits you.

There are 10 problems; each problem is worth 10 points. SHOW your work. Make your work be coherent and clear. Write in complete sentences whenever this is possible. $\boxed{\textit{CIRCLE}}$ your answer. **CHECK** your answer whenever possible. **No Calculators.**

If I know your e-mail address, I will e-mail your grade to you. If I don't already know your e-mail address and you want me to know it, then **send me an e-mail**.

I will post the solutions on my website shortly a few hours after the exam is finished.

1. Find $\lim\limits_{x\to 0^-} (1+3x)^{\frac{4}{x}}$.

2. Find $\lim\limits_{x\to 0} \frac{1-\cos 3x}{x^2}$.

3. Find $\lim\limits_{x\to\infty} \sqrt{x^2-10x}-\sqrt{x^2+4x}$.

4. Find a system of parametric equations which parameterizes $\frac{x^2}{9}+\frac{y^2}{16}=1$.

5. The position of an object at time t is given by

$$\begin{cases} x = t-1 \\ y = t^2+2. \end{cases}$$

(a) Eliminate the parameter to find a Cartesian equation for the path of the object.
(b) Graph the path of the object.
(c) On your graph, mark the position of the object at a few particular values for time.

6. Solve $e^{-2x}-3e^{-x}=-2$.

7. Solve $\ln(4x)-3\ln(x^2)=\ln 2$.

8. Simplify $\sin(\cos^{-1} x)$. Your answer should not contain any Trig functions or inverse Trig functions.

9. Find an equation for the family of lines that pass through the intersection of $5x-3y+11=0$ and $2x-9y+7=0$.

10. Let $f(x)=\frac{x-2}{x+3}$.
(a) What is the domain of f?
(b) Find a formula for $f^{-1}(x)$.
(c) What is the domain of f^{-1}?
(d) Verify that $f(f^{-1}(x))=x$ for all x in the domain of f^{-1}.
(e) Verify that $f^{-1}(f(x))=x$ for all x in the domain of f.