Recitation Time______ PRINT your name ____________________________________

Math 141, Exam 4, Spring 2009

The exam is worth a total of 50 points. There are 8 questions on 5 pages. **SHOW your work. Make your work be coherent and clear.** Write in complete sentences whenever this is possible. $\boxed{CIRCLE}$ your answer. **CHECK** your answer whenever possible. **No Calculators.**

I will post the solutions sometime this afternoon.

1. (7 points) Let $y = x\arcsin(2x)$. Find $\frac{dy}{dx}$.

2. (7 points) Let $y = e^{x\sin x}$. Find $\frac{dy}{dx}$.

3. (6 points) Find $\lim_{x \to 0^+} x \ln x$.

4. (6 points) Let $f(x) = x^3 - 3x$. Where is $f(x)$ increasing and decreasing? Where is $f(x)$ concave up and concave down? Find the local extreme points and points of inflection of $y = f(x)$? Graph $y = f(x)$.

5. (6 points) Let $f(x) = xe^x$. Find all vertical and horizontal asymptotes of $y = f(x)$. Where is $f(x)$ increasing and decreasing? Where is $f(x)$ concave up and concave down? Find the local extreme points and points of inflection of $y = f(x)$? Graph $y = f(x)$.

6. (6 points) A man 6 feet tall is walking away from an 18 foot tall street light at the rate of 7 ft/sec. At what rate is his shadow lengthening? **Be sure to give units.**

7. (6 points) Find the absolute maximum points and absolute minimum points of the function $f(x) = x^2 - 2x + 2$ which is defined for $0 \leq x \leq 4$.

8. (6 points) A rectangular area of 3200 square feet is to be fenced off. Two opposite sides will use fencing costing \$1 per foot and the remaining sides will use fencing costing \$2 per foot. Find the dimensions of the rectangle of least cost.