Math 141, Exam 1, 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.

The exam is worth a total of 100 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.**

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

1. (20 points) Graph $y = x^2$, $y = (x-1)^2$, and $y = x^2 + 1$.

2. (20 points) Graph $y = x^{1/3}$, $y = x^{2/3}$, and $y^2 = x^{1/3}$.

3. (10 points) Find all lines through $(6, -1)$ for which the product of the x and y intercepts is 3 .

4. (10 points) Compute $\sin(\cos^{-1}(2/3) + \cos^{-1}(1/3))$.

5. (10 points) Solve $1 + 3\log_2 x = \log_2(3x)$.

6. (20 points) Let $f(x) = x - 5x^2$ for $x \le \frac{1}{10}$.
(a) Find a formula for $f^{-1}(x)$.
(b) What is the domain of $f^{-1}(x)$?
(c) Verify that $f(f^{-1}(x)) = x$ for all x in the domain of f^{-1} .
(d) Verify that $f^{-1}(f(x)) = x$ for all x in the domain of f .

7. (10 points) An open box is to be constructed from a rectangular sheet of metal, 8 inches by 15 inches, by cutting out squares with sides of length x from each corner and bending up the sides. Express the volume V as a function of x .