Math 142, Exam 1, Fall 2009

PRINT Your Name:________________________

When does your FRIDAY class meet? _______
Write your answers as legibly as you can.

There are 11 problems on 6 pages. The exam is worth 100 points. Problem 1 is worth 10 points. Each of the other problems is worth 9 points. 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 or Cell phones.**

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

1. Define the definite integral. Give a complete definition. Be sure to explain all of your notation.

2. State both parts of the Fundamental Theorem of Calculus. Be sure to explain all of your notation.

3. Find $\int 5x\cos(x^2)dx$. **Check your answer.**

4. Find $\int \frac{y^2 dy}{\sqrt{3-4y}}$. **Check your answer.**

5. Find $\int \frac{x}{\sqrt{1-4x^4}} dx$. **Check your answer.**

6. Find the area between $x + y = 0$ and $2 = x + y^2$.

7. Find the length of of the curve parameterized by $x = \cos 2t$, $y = \sin 2t$, with $0 \le t \le \pi/2$.

8. Consider the region in the first quadrant bounded by $y = x^2$ and $x = 1$. Revolve this region about $x = 4$. Find the volume of the resulting solid?

9. Consider the region in the first quadrant bounded by $y = e^x$ and $x = \ln 3$. Revolve this region about the x-axis. Find the volume of the resulting solid.

10. Consider the solid whose base in the first quadrant of the xy plane is bounded by $y = x^2$ and $y = 1$. Each cross section of this solid perpendicular to the y-axis is a square. Find the volume of the resulting solid.

11. Suppose that a conical tank is filled with oil which has a density of 50 lb/ft^3. The radius at the top of the tank is 5 ft and the tank is 15 ft high. How much work is done in pumping the oil over the edge of the tank? **Be sure to include units in your answer.**