MATH 2260

Midterm Exam I

September 16, 2008

NAME (please print legibly): _____

Your University ID Number: _____

Please complete all questions in the space provided. Draw a box around your final answer. You may use the backs of the pages for extra space, or ask me for more paper if needed. Work carefully, and neatly (part of your grade will be based on how well your work is presented).

Try to complete the problems you find easier before going back to the harder ones. Good luck!

QUESTION	VALUE	SCORE
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
TOTAL	70	

1. (10 points) The area bounded by the curves $y = x^3$, $y = 0$, $x = 2$ is rotated around the x axis to create a solid. Find the volume of this solid. Use any method.

2. (10 points) The area bounded by the curves $y = 2 - x^2$, $y = x^2$ and $x = 0$ is rotated around the y axis to create a solid. Find the volume of this solid. Use the method of cylindrical shells.

3. (10 points) Find the length of the portion of the curve

$$x(t) = 8\cos t + 8t\sin t \quad y(t) = 8\sin t - 8t\cos t$$

with t between 0 and $\pi/2$.

4. (10 points) The portion of the curve $x = y^3/3$ with y between 0 and 1 is rotated around the y axis to generate a surface of revolution. Find the area of this surface.

5. (10 points) Solve the differential equation $2\sqrt{xy}\frac{dy}{dx} = 1$, assuming that y and x are both > 0. Your solution should contain an unknown constant C.

6. (10 points) A climbing rope weighs $0.624N/m$. A climber hauls $50m$ of the rope up a cliff. How much work is done?

7. (10 points) A storage tank is created by rotating the area bounded by the curves $y = x^2$, $x = 0$, $y = 16$ around the y axis. The units on the axes are in meters. The tank is filled with seawater, which weighs $10,000 N/m^3$. How much work will it take to empty the tank by pumping the water to the top of the tank?