Name:_____

Student ID:_____

Section:_____

Instructor:_____

Math 2414 (Calculus II)
Practice Exam 1

Instructions:

- Work on scratch paper will not be graded.
- Show all your work in the space provided. Full credit will be given only if the necessary work is shown justifying your answer.
- **Please write neatly. If I cannot read your handwriting, you will not receive credit.**
- Simplify your answers as much as possible. Expressions such as $\ln(1)$, e^0, $\sin(\pi/2)$, etc. must be simplified for full credit.

Show all work in the space provided. Full credit will be given only if all steps are shown justifying your answer. Please write neatly and carefully, if I cannot read your handwriting, you will receive NO credit.

1. (10 points) Find the given integral (show all work).

   (a) $\int \frac{x+6}{\sqrt{x}} dx$

   (b) $\int \frac{x}{x^2-3} dx$

2. (10 points) Sketch the region bounded by the given curves. Set up the integral and evaluate the integral to find the area of the region. Show all work.

$$f(x) = x^4 - 4x^2, g(x) = x^3 - 9x.$$

3. (10 points) Apply the **disk/washer method** to set up the integral (**DO NOT EVALUATE**) to find the volume of the solid formed by revolving the region bounded by the given graphs about the given axis.

   (a) $x = 2\sqrt{y}$, $x = 0$, $y = 9$ about the y-axis.

   (b) $xy = 1$, $y = 0$, $x = 1$, $x = 2$ about $x = -1$.

4. (10 points) Apply the **shell method** to set up the integral (**DO NOT EVALUATE**) to find the volume of the solid formed by revolving the region bounded by the given graphs about the given axis.

   (a) $y = x(x-1)^2$, $0 \leq x \leq 1$ about the y-axis.

   (b) $x = (y-3)^2$, $x = 4$ about $y = 1$.

5. (10 points) Set up the integral (**DO NOT EVALUATE**) to find the arc length of the graph of the function over the given integral.

$$y = \ln(\cos(x)) \text{ over } [0, \frac{\pi}{3}].$$

6. (10 points) Set up the integral (**DO NOT EVALUATE**) to find the surface area of the surface generated by revolving the curve on the given interval about the y-axis.

$$y = \sqrt[3]{x} + 2, 1 \leq x \leq 8.$$

7. (10 points) Set up the integral (**DO NOT EVALUATE**) to find the work done in emptying the tank in the figure by pumping the water of of the spout. Water weighs 62.5 lb/ft^3.

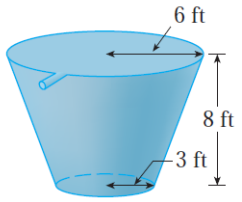

Figure 1: Figure for Question 7

8. (10 points) Set up the integral (**DO NOT EVALUATE**) to find the volumes of the solids whose bases are bounded by the circle $x^2 + y^2 = 4$ and cross sections perpendicular to the x-axis are isoceles right triangles.

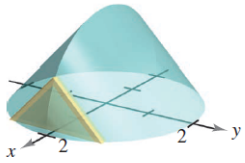

Figure 2: Figure for Question 8

9. (10 points) Find the integral $\int e^{4x}\cos(2x)dx$

10. (10 points) Use the tabular method the find the integral $\int_0^1 \ln(4+x^2)dx$

END OF EXAM