

MATH 162

FIRST MIDTERM EXAM

February 17, 2005

8:00-9:15 AM (75 minutes)

NAME (please print legibly): _____

Your U of R ID Number: _____

Circle your Professor's name: Dean Heap Jackson Pizer

- No calculators are allowed on this exam.
- Please show all of your work. An answer without the reasons given will receive points. Make sure that you show all of your work.
- Please indicate your final answer CLEARLY!

QUESTION	VALUE	SCORE
1.	30	
2.	20	
3.	30	
4.	30	
5.	30	
6.	30	
7.	30	
TOTAL	200	

1. (30 pts) Sketch the regions enclosed by the given curves, and find the areas of the regions.

(a) $y = 6 - x^2$, $y = x^2 - 2$

(b) $4x + y^2 = 12$, $x = y$

2. (20 pts) Using the washer method, find the volume of the solid obtained by rotating the region bounded by the curves

$$y = \frac{1}{x}, y = 0, x = 1, x = 3$$

about the line $y = -1$.

3. (30 pts) Evaluate the following integrals:

(a) $\int \frac{\sin \sqrt{t}}{\sqrt{t}} dt$

(b) $\int_e^{e^4} \frac{dx}{x\sqrt{\ln x}}$

(c) $\int t^2 e^{2t} dt$

4. (30 pts) Evaluate the following integrals.

(a) $\int \frac{x+3}{x^2+4x-12} dx$

(b) $\int \frac{1}{x^3+x} dx$

5. (30 pts) Using the method of cylindrical shells, find the volume of the solid obtained by rotating the region bounded by

$$y = \sqrt{x} \quad \text{and} \quad y = x^2$$

about the y -axis.

6. (30 pts) A tank has the shape of an inverted square pyramid with height 8m and square base of side length 4m. The tank is full of water. Find the work required to empty the tank by pumping all of the water to the top of the tank. (Use the fact that water density is 1000 kg/m^3 .)

7. (30 pts) Evaluate the following integrals.

(a) $\int \tan^3 \theta \sec^3 \theta d\theta$

(b) $\int x^3 \sqrt{4+x^2} dx$ (You must use trigonometric substitution to receive any credit for this problem.)