Math 202
Hour Exam 1

Name: _____ Date: _____

9 Problems. 150 Points. Follow directions carefully. Please do not leave any question blank, and turn off cell phones and other noisemakers to avoid disturbing your classmates.

I have verified that this exam contains 9 problems and 8 printed pages. Initial____.

Print the name of the people sitting either side of you :- _____

Question	**Points Value**	**Points Awarded**	**Section Totals**
Name	2		
Short Answer 1	15		
Short Answer 2	15		
Short Answer 3	15		
Short Answer 4	15		
Short Answer 5	15		
Short Answer 6	15		
Short Answer 7	15		
Short Answer 8	15		
Long Answer 1	32		
Long Answer 2	32		
Long Answer 3	32		
Long Answer 4	32		
Total	250		

Short Answer (12 points each) - keep explanations and calculations brief and where appropriate, answers should be exact.

1. Determine the area bounded between $y = 3x^2$ and $y = 2x$.

2. Determine the average value of $\sin(x)$ on the interval $[0, 2\pi]$.

3. Find A and B if

$$\frac{2}{(x+2)(x+3)} = \frac{A}{x+2} + \frac{B}{x+3}.$$

4. (Hint: Simplify!) Show that

$$\int (\cos(x)\sin^2(x) + \cos^3(x))dx = \sin(x) + C.$$

5. Evaluate the integral

$$\int \ln(x)dx$$

using integration by parts showing your steps.

6. Approximate the definite integral

$$\int_0^4 \sqrt{1+x^2}dx$$

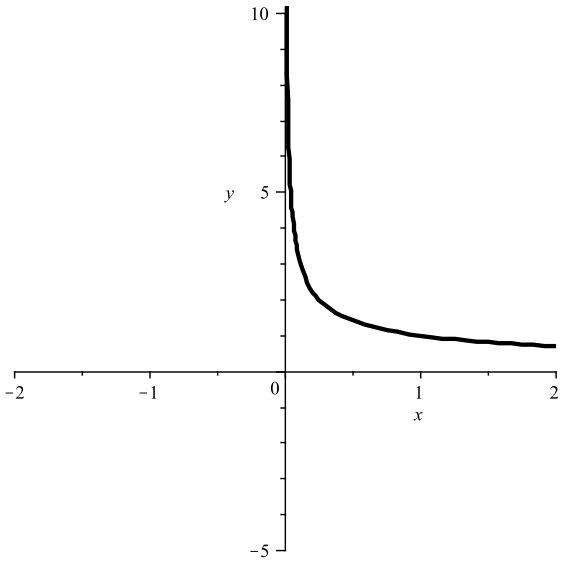
using the Trapeziod rule with $n = 4$ subdivisions. Show your work.

Long Answer (26 points each) - show work and provide explanations, an answer without supporting work is not worth much.

1. (This question continues on the next page) Let

$$f(x) = \frac{1}{\sqrt{x}}$$

(see illustration below) and let R be the infinite region bounded between the x-axis, the y-axis, the line $x = 1$ and the function $f(x)$.



(a) (4 Points) Set up an improper integral to calculate the area of the region R.

(b) (6 Points) Evaluate the improper from part (a) to show that this area is finite.

(c) (6 Points) Set up an integral to calculate the volume of the solid obtained by rotating the region R about the y-axis (you may use washers or shells).

(d) (10 points) Evaluate the improper integral from part (c) to show that the volume of the corresponding solid is finite.

2. (a) (8 points) Show that the following two integrals are equal:

$$\int_0^1 \sqrt{(1+x^2)}dx = \int_0^{\frac{\pi}{4}} \frac{1}{\cos^3(\theta)}d\theta.$$

(b) (12 points) Evaluate the indefinite integral

$$\int \frac{1}{\cos^3(\theta)}d\theta$$

using Tables.

(c) (6 points) Use your results to evaluate the definite integral

$$\int_0^1 \sqrt{(1+x^2)}dx.$$

3. (26 points) Evaluate **one** of the following two integrals showing **all** your work without using tables.

(a)

$$\int_0^2 \frac{1}{x^2+4x+13}dx$$

(b)

$$\int \frac{32}{(x^2-4)(x^2+4)}dx$$