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 9 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	12		
Short Answer 2	12		
Short Answer 3	12		
Short Answer 4	12		
Short Answer 5	12		
Short Answer 6	12		
Long Answer 1	25		
Long Answer 2	25		
Long Answer 3	25		
Long Answer 4	25		
Total	150		

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

1. Determine the area bounded between $y = 1/x$ and $y = x^2$ between $x = 1$ and $x = e$ (you may assume they do not cross inside this interval).

2. Determine the average value of $f(t) = 2te^{-t^2}$ on the interval $[0, 5]$.

3. Use the trapezoid sum with $n = 4$ subdivisions to approximate the integral

$$\int_{-2}^{2} (x^2 - 1)dx.$$

4. Determine the partial fraction decomposition of

$$f(x) = \frac{4x - 1}{(x - 1)(x + 2)}$$

(you do not have to integrate $f(x)$ - just find the partial fraction decomposition).

5. Let S be the solid obtained by rotating a region about the y-axis. If you use cylindrical shells to determine the volume of S, will you be integrating with respect to x or y?

6. Evaluate the following integral:

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

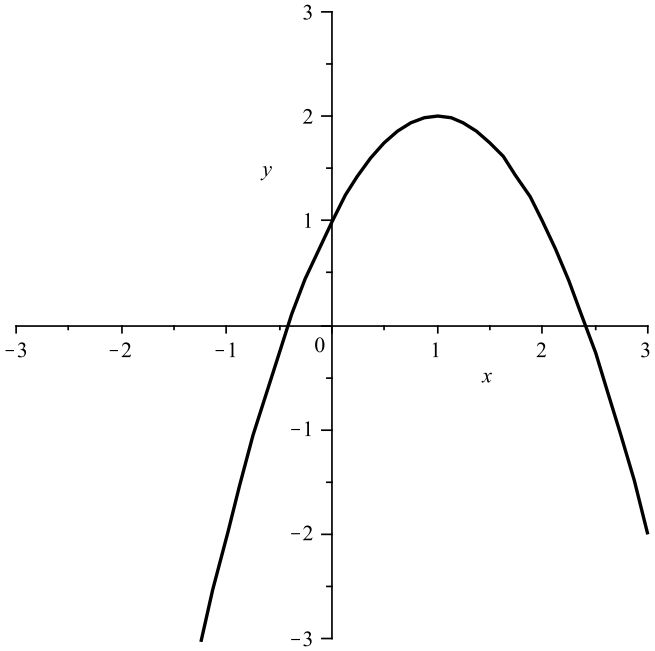
(Hint: You don't need partial fractions!)

Long Answer (25 points each) - show work and provide explanations, an answer without supporting work is not worth much.

1. (This question continues on the next page)

   (a) (5 Points) Determine the points of intersection of the curves $y = x^2 + 1$ and $y = -x^2 + 2x + 1$.

   (b) (5 Points) On the axis below is the graph of $y = -x^2 + 2x + 1$. On the same axis, sketch the curve $y = x^2 + 1$ and shade the area bounded between them. Also, sketch the line $x = -1$.



(c) (7 Points) Set up an integral to calculate the volume obtained by rotating the region bounded by $y = x^2 + 1$ and $y = -x^2 + 2x + 1$ about the line $x = -1$ using either washers or shells specifying which you use.

(d) (8 Points) Evaluate the integral you found above to determine the volume obtained by rotating the region bounded by by $y = x^2 + 1$ and $y = -x^2 + 2x + 1$ about the line $x = -1$.

2. (This questions continues over the page)

   (a) (10 points) Evaluate the integral

$$\int 3\cos(x)\sin(2x)dx$$

   (Hint: $\sin(2x) = 2\sin(x)\cos(x)$).

(b) (15 points) Use your answer to the previous part to evaluate the integral

$$\int 3x \cos(x) \sin(2x) dx$$

3. (25 points) Evaluate **one** of the following two integrals showing **all** your work without using tables.

(a)

$$\int \frac{(x+3)}{(x-1)(x^2+1)}dx$$

(b)

$$\int \frac{1}{(x^2+2x+2)^2}dx$$