MA	166
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## DIRECTIONS

- 1. Write your name, student ID number, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3, and 4.
- 2. The test has four (4) pages, including this one.
- 3. Write your answers in the boxes provided.
- 4. You must show sufficient work to justify all answers. Correct answers with inconsistent work may not be given credit.
- 5. Credit for each problem is given in parentheses in the left hand margin.
- 6. No books, notes or calculators may be used on this test.

Evaluate the integrals in problems 1–5.

(6) 1. 
$$\int \tan^2 x \, dx$$

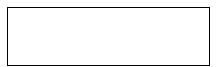
(12) 2. 
$$\int \frac{x+1}{x^3+x} dx$$

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(12) 3. 
$$\int x^3 \sqrt{1+x^2} \, dx$$

(12) 4. 
$$\int \sqrt{1-4x^2} \, dx$$

(6) 5. 
$$\int_0^{\frac{\pi}{2}} \cos^3 x \, dx$$



(12) 6. Determine whether each integral is convergent or divergent. Find its value if it is convergent. <u>Important</u>: Show clearly how limits are involved.

(a) 
$$\int_0 x e^{-x^2} dx$$

(b) 
$$\int_{1}^{3} \frac{1}{x-1} dx$$



(10) 7. Find the length of the curve  $y = \frac{1}{3} (x^2 + 2)^{\frac{3}{2}}, 0 \le x \le 1$ .

(8) 8. Set up an integral for the area S of the surface obtained by rotating the curve  $y = \ln x$ ,  $1 \le x \le 2$ , about the x-axis. Do not evaluate the integral.

(12) 9. Consider the lamina bounded by the curves y = x<sup>2</sup>, y = 0, x = 1, and with density ρ = 1. Find the following:
(a) The mass m of the lamina.

- (b) The moment  $M_y$  of the lamina about the y-axis.
- (c) The moment  $M_x$  of the lamina about the x-axis.
- (d) The center of mass  $(\bar{x}, \bar{y})$  of the lamina.

(10) 10. Determine whether the sequence converges or diverges. If it converges, find the limit.
 (You need not show work for this problem).

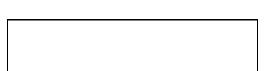
(a)  $a_n = \cos n\pi$ 

(b) 
$$a_n = \frac{\sqrt{n}}{1+n}$$

(c)  $a_n = \frac{\ln n^2}{n}$ 

(d) 
$$a_n = \frac{n \sin n}{n^2 + 1}$$

(e) 
$$a_n = \frac{3n^2 - 2n + 1}{2n^2 + n - 1}$$





m =

 $(\bar{x}, \bar{y}) =$