NAME _			

STUDENT ID \_\_\_\_\_

RECITATION INSTRUCTOR \_\_\_\_\_

RECITATION TIME \_\_\_\_\_

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## **DIRECTIONS**

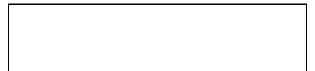
- 1. Write your name, student ID number, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3, and 4.
- 2. The test has four (4) pages, including this one.
- 3. Write your answers in the boxes provided.
- 4. You must show sufficient 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.

Find the integrals in problems 1-5.

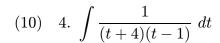
(6) 1. 
$$\int_0^{\pi/4} \sin^2 x \ dx$$

(8) 2. 
$$\int \tan^3 x \ dx$$

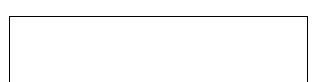
$$(\mathrm{Hint:}\ \frac{d}{dx}\ln|\cos x| = -\tan x\ )$$



$$(10) \quad 3. \int \frac{1}{x^2 \sqrt{x^2 - 9}} \, dx$$



(10) 5. 
$$\int \frac{1}{x^2 - 2x + 5} dx$$



(12) 6. Consider the partial fraction decomposition:

$$\frac{x^4 + x^3 - x^2 - x + 1}{x^3 - x} = Ax + B + \frac{C}{x} + \frac{D}{x - 1} + \frac{E}{x + 1}$$

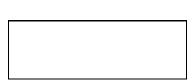
Find the constants A, B, C, D and E.

A= , B= , C= , D= , E=

(12) 7. Determine whether each integral is convergent or divergent. Find its value if it is convergent. Important: You must show clearly how limits are involved.

a.) 
$$\int_{2}^{\infty} \frac{1}{x-1} dx$$

b.)  $\int_{0}^{3} \frac{1}{\sqrt{x}} dx$ 



(10) 8. Set up an integral for the area S of the surface obtained by rotating the curve  $y=1-x^2,\ 0\leq x\leq 1$  about the y-axis. (DO NOT evaluate the integral.)

$$S = \int$$

- (12) 9. Consider the lamina bounded by the curves  $y=x^3,\ y=0,\ x=1$  and with density  $\rho=1.$  Find the following.
  - (a) The mass m of the lamina.

m =

(b) The moment  $M_y$  of the lamina about the y-axis.

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 $M_y =$ 

(c) The moment  $M_x$  of the lamina about the x-axis.

 $M_x =$ 

(d) The center of mass  $(\overline{x}, \overline{y})$  of the lamina.

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

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

(a) 
$$\left\{\sin\frac{n\pi}{2}\right\}$$

(b)  $\left\{\cos\frac{\pi}{n}\right\}$ 

(c)  $a_n = \frac{3+5n^2}{n+n^2}$ 

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

(e)  $a_n = \frac{\ln(4+e^n)}{5n}$