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| STUDENT ID            | Page 2 | /28  |
| RECITATION INSTRUCTOR | Page 3 | /22  |
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|                       | TOTAL  | /100 |

## DIRECTIONS

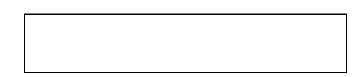
- 1. Write your name, student ID number, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3, 4 and 5.
- 2. The test has five (5) pages, including this one.
- 3. Write your answers in the boxes provided.
- 4. You must show sufficient 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.
- (12) 1. Find the integral by means of the substitution  $u = \sqrt{x}$ .

$$\int \frac{\sqrt{x+1}}{x+1} \, dx$$

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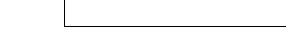
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(10) 2. Find the integral 
$$\int \frac{3x}{x^2 - 4x + 4} dx$$
.



(18) 3. Determine whether the improper integral converges or diverges. If it converges find its value. <u>Important</u>: Show clearly how limits are involved.

(a) 
$$\int_{1}^{\infty} \frac{1}{x^{3/2}} dx$$



(b) 
$$\int_0^{\frac{\pi}{2}} \tan x \, dx$$

(10) 4. Let R be the region between the graphs of the equations y = 3x and  $y = x^2 + 2$ . Use the washer method to set up an integral for the volume V of the solid generated by revolving the region R about the x-axis. Do not evaluate the integral.

$$V = \int$$

(12) 5. Let R be the region between the graph of  $f(x) = \sin x$  and the x axis on the interval  $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ . Find the volume of the solid generated by revolving R about the y axis.

(10) 6. Find the area S of the surface generated by revolving about the x axis the graph of  $y = \frac{x^3}{3}$  on the interval [0, 1].

S =

(10) 7. A tank in the shape of an inverted cone 12 feet tall and 3 feet in radius is full of water. Set up an integral for the work W required to pump all the water over the edge of the tank. Do not evaluate the integral. (Water weighs 62.5 lbs/ft<sup>3</sup>).

$$W = \int$$

(10) 8. Find the center of gravity  $(\bar{x}, \bar{y})$  of the region R between the graphs of y = 2 - x and y = x - 2 on the interval [0, 2]. You may use symmetry for one of the coordinates, but must show complete work for the other.

$$ar{x}= ar{y}=$$

(8) 9. Find the third Taylor polynomial  $p_3(x)$  of  $f(x) = \tan^{-1} x$ .

$$p_3(x) =$$