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RECITATION TIME	TOTAL	/100

DIRECTIONS

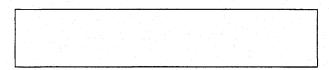
- 1. Write your name, student ID number, recitation instructor's name and recitation time in the space provided above. Also write your name at the top of pages 2, 3, and 4.
- 2. The test has four (4) pages, including this one.
- 3. Write your answers in the boxes provided.
- 4. You must show sufficient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

(8) 1.
$$\int \cot^3 x \sin^2 x \, dx$$

		r	}
(8)	2.	- [$\sec^4 x \tan x dx$
		J_0	

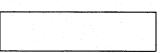
$$(10) \quad 3. \quad \int \frac{dx}{(x^2+9)^{\frac{3}{2}}}$$



(6) 4.
$$\int_0^3 x\sqrt{9-x^2} \, dx$$



(10) 5.
$$\int_0^1 \frac{2x+3}{(x+1)^2} dx$$

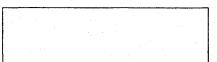


(6) 6. Write out the form of the partial fraction decomposition of the function below. Do not determine the numerical values of the coefficients.

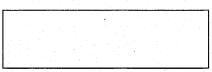
$$\frac{1}{(x^2-1)(x^2+1)^2}$$

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

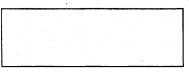
(a)
$$\int_{1}^{\infty} \frac{\ln x}{x} dx$$



(b) $\int_1^2 \frac{1}{\sqrt{x-1}} \, dx$



(8) 8. Find the length of the curve y = f(x), $\frac{\pi}{4} \le x \le \frac{\pi}{3}$, given that $f'(x) = \sqrt{\tan^2 x - 1}$.



(8) 9. Set up an integral for the area S of the surface obtained by rotating the curve $y = \cos x$, $0 \le x \le \frac{\pi}{2}$ about the y-axis. Do not evaluate the integral.

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(12) 10. Consider the lamina bounded by the curves $y = 1 - x^2$ and y = 0, 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

 $M_y =$

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

 $M_x =$

(d) The centroid (\bar{x}, \bar{y}) of the lamina

(ar x,ar y)=

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

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

(b)
$$a_n = \frac{(-1)^n}{n}$$

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

(d)
$$a_n = (-1)^n n$$

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

(f)
$$a_n = \frac{n \cos n}{n^2 + 3}$$