

**Math 132 – Calculus II**  
**Review Problems for Test 1**  
February 22, 2002

1. The function  $f(x) = 1/(x^2+1)$  has an antiderivative  $F(x)$  such that  $F(1) = 0$ . Find  $F(x)$ .
2. Write the following limit as a definite integral over the interval  $[1, 2]$ :

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{1}{1+x_i} \Delta x.$$

3. Using the Fundamental Theorem of Calculus, evaluate  $\int_0^{\pi/4} \sec^2 t \, dt$ .
4. Use a substitution to evaluate the following integrals.

a)  $\int \sin(3s+1) \, ds$

b)  $\int \frac{dx}{4x-7}$

c)  $\int \frac{x}{x-5} \, dx$

d)  $\int_0^{\pi/2} \sin^5 x \cos x \, dx$

e)  $\int_1^e \frac{\ln t}{t} \, dt$

5. Find the area trapped between the two curves  $y = x^2 - 4$  and  $y = 4 - x^2$ .
6. Find the area trapped between the two curves  $y = x^2 - 4$  and  $y = 4 - x^2$  over the interval  $[-1, 1]$ .
7. Find the area trapped between  $y = 2x - x^2$  and  $y = 1 - e^{-x}$ . These two curves obviously intersect at  $x = 0$ . Use your calculator to find the  $x$ -coordinate of the second point of intersection.
8. A solid of width 4 cm has a vertical cross section  $x$  cm from its left side which is a square of side length  $e^{-x}$ . Find its volume.
9. Let  $R$  be the region in the  $xy$ -plane bounded by the graph of  $f(x) = 1/x$ , the  $x$ -axis, and the vertical lines  $x = 1$  and  $x = 2$ . Find the volume of the solid obtained by rotating  $R$  about the  $x$ -axis.
10. Find the volume of the solid obtained by rotating the region  $R$  of problem #9 above about the  $y$ -axis.