

Math 1210-90 Calculus I

Examination 3, November 20 and 22, 2003

**WARNING: You may use calculators, but you must show enough work to convince me that you can do the problem.**

1. Find the function  $y = f(x)$  which satisfies the differential equation  $x^2y' + (1+x^2)y^2 = 0$  such that  $f(1) = 2$ .

2. Find the definite Integrals:

a) 
$$\int_{-\pi/2}^{\pi/2} \cos^2 x \sin x dx =$$

b) 
$$\int_1^2 (x^2 + x^{-2}) dx =$$

3. Find the area of the region above the  $x$ -axis and below the curve  $y = \sec^2 x$  lying between the lines  $x = -\pi/4$  and  $x = \pi/4$ ,

4. The region in the first quadrant between the coordinate axes and the curve  $y = 1 - x^{2/3}$  is rotated about the  $y$ -axis. Find the volume of the resulting solid.

5. The region bounded by the  $x$ -axis and the curve  $y = 2x - x^2$  is rotated about the  $x$ -axis. Find the volume of the resulting solid.