

**MATH 16C:
FAKE TEST 1A**

SPRING 2007

- (1) Verify that the equation

$$x^2 + y^2 = Cy$$

implicitly defines solutions of the following differential equation:

$$y' = \frac{2xy}{x^2 - y^2}.$$

- (2) Consider the following differential equation:

$$\frac{dy}{dx} = \frac{y \cos(x)}{1 + 2y^2}.$$

- a) Find the general solution of the above differential equation.
b) Find the particular solution which passes through the point $(0, 1)$.

- (3) Find the general solution to

$$(1 + x^2)y' + 4xy = \frac{\sqrt{x}}{1 + x^2} \text{ for } x > 0.$$

- (4) A large corporation starts at time $t = 0$ to invest part of its profits at a rate of P dollars per year in a particular fund. If the fund earns r percent interest per year (compounded continuously), then the rate of growth of the amount in the fund A is given by:

$$\frac{dA}{dt} = rA + P.$$

Solve this differential equation. (Recall: $A(0) = 0$.)

(5) Find the center and radius of the following sphere

$$2x^2 + 2y^2 + 2z^2 - 4x - 12y - 8z + 3 = 0.$$