

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

SPRING 2007

- (1) Verify that

$$y = \frac{2 + \ln(x)}{x}$$

is a solution of the following differential equation:

$$x^2 y' + xy = 1.$$

What initial condition does this solution satisfy at $x = 1$?

- (2) Consider the following differential equation:

$$y' = \frac{x^2 e^{2y}}{1 + x^3}.$$

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

- (3) Find the general solution to

$$y' + \frac{2}{x}y = \frac{\cos(x)}{x^2}, \text{ for } x > 0.$$

- (4) At any time t , the rate of growth of a population of deer N in a state park is proportional to the product of N and $L - N$, where $L = 500$ is the maximum number of deer the park can maintain. When $t = 0$, $N = 100$, and when $t = 4$, $N = 200$. Write N as a function of t .

- (5) Consider the following sphere

$$(x - 1)^2 + (y - 3)^2 + (z - 2)^2 = 25.$$

Sketch the traces of this graph corresponding to: $y = -2$, $y = 0$, $y = 3$, $y = 6$, and $y = 8$. What does this tell you about the graph of the sphere?