

MthU343

Northeastern University

DiffEQs & Linear Alg. for Engineering

30 Minutes

Professor Gilmore

July 10, 2008

Quiz #2

Name: _____.

Show All Your Work

1. Solve the following differential equation:

$$3x'' - 5x' - 2x = 0, \text{ with } x(0) = 2 \text{ and } x'(0) = 1$$

2. Solve the following differential equation:

$$x'' + 2x' + 2x = 0 \text{ with } x(0) = 5 \text{ and } x'(0) = 6$$

3. Solve the following differential equation:

$$9x'' - 6x' + x = 0 \text{ with } x(0) = 1 \text{ and } x'(0) = 7/3$$

Please Turn Over and Continue Working

4. There is a very fertile breed of rabbits which has both the birth rate and the death rate proportional to the population, with $\beta > \delta$.

A. Find the expression for the population as a function of time.

b. If $P(0) = 6$ and that $P(10 \text{ months}) = 9$, At what time does the population explode to an infinite number?

5. Consider the differential equation $x' = kx - x^3$.

a. Suppose that $k < 0$. Find the critical points, and give reasoning about why certain ones are stable.

b. Suppose that $k > 0$. Find the critical points, and give reasoning about why certain ones are stable.