

MthU343

Northeastern University

DiffEQs & Linear Alg. for Engineering

30 Minutes

Professor Gilmore

Aug. 13, 2008

Quiz #6

Name: \_\_\_\_\_.

Show All Your Work

1. Solve the following system of ordinary differential equations by changing it to an equivalent single second order equation and solving that by methods previously studied in this course:

$$\begin{aligned}x' &= y \text{ and } x(0) = 1 \\y' &= 6x - y \text{ and } y(0) = 2\end{aligned}$$

2. Use the eigenvalue method to solve the system of ordinary differential equations:

$$\begin{aligned}x_1' &= 4x_1 + x_2 \\x_2' &= 3x_1 + 2x_2\end{aligned} \quad \text{with } 1 = x_1(0) = x_2(0)$$

**Please Turn Over and Continue Working**

3. Use the eigenvalue method to solve the system of ordinary differential equations:

$$\begin{aligned}x_1' &= 5x_1 + 5x_2 + 2x_3 \\x_2' &= -6x_1 - 6x_2 - 5x_3, \text{ given that the eigenpairs of the matrix} \\x_3' &= 6x_1 + 6x_2 + 5x_3\end{aligned}$$

$$A = \begin{pmatrix} 5 & 5 & 2 \\ -6 & -6 & -5 \\ 6 & 6 & 5 \end{pmatrix} \text{ are}$$

$$\left( 0, \begin{pmatrix} -1 \\ 1 \\ 0 \end{pmatrix} \right), \left( 2 + 3i, \begin{pmatrix} 1 + i \\ -2 \\ 2 \end{pmatrix} \right), \text{ and } \left( 2 - 3i, \begin{pmatrix} 1 - i \\ -2 \\ 2 \end{pmatrix} \right)$$