Name_____

Student I.D.

Math 2250-1 Quiz 12 November 30, 2012

Here is a matrix, and its eigenvalue-eigenvector data:

$$A := \begin{bmatrix} -3 & 2\\ 2 & -3 \end{bmatrix}$$

For $\lambda_1 = -1$, $\underline{\boldsymbol{\nu}} = \begin{bmatrix} 1\\ 1 \end{bmatrix}$. For $\lambda_2 = -5$, $\underline{\boldsymbol{\nu}} = \begin{bmatrix} 1\\ -1 \end{bmatrix}$.

1) Consider the following first order system of first order differential equations, which could arise from an input-output model:

$$x_1'(t) = -3 x_1 + 2 x_2 x_2'(t) = 2 x_1 - 3 x_2$$

Use the eigendata you have been given to write down the general solution to this system of DE's.

(4 points)

2) Consider the following system of second order differential equations, which could arise from an undamped configuration of two masses and three springs connected in parallel, as we've considered this week.

$$x_1''(t) = -3 x_1 + 2 x_2$$

$$x_2''(t) = 2 x_1 - 3 x_2$$

a) Use the eigendata you have been given to write down the general solution to this system of DE's.

(4 points)

b) Solve the initial value problem for this system of DE's, with initial data $x_1(0) = 2, x_1'(0) = 0, x_2(0) = 2, x_2'(0) = 0$.

(2 points)