

Differential Equations – Homework 27

Professor:

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Homework 27

Please do the Matrix Review if you need it!!

Directions: Do the following book problems

Section 5.2 problems: 1, 3, 5, 8, 10,

OPTIONAL - Verify, using the example system below, the following claims made in class:

1. Complex conjugate eigenvalues will produce complex conjugate eigenvectors. To do this, just solve for each of the eigenvectors individually and show that they are complex conjugates.
2. If you have complex conjugate eigenvalues and eigenvectors, you can write the solution by using the real and imaginary part of just ONE of the $\vec{v}_1 e^{\lambda_1 t}$ solutions and Euler's formula. To do this compare what you get from using the trick, versus converting the full solution

$$\vec{x} = c_1 \vec{v}_1 e^{\lambda_1 t} + c_2 \vec{v}_2 e^{\lambda_2 t}$$

using Euler's formula and a bunch of simplification.

$$\vec{x}' = \mathbf{A}\vec{x} \quad \mathbf{A} = \begin{bmatrix} 4 & -3 \\ 3 & 4 \end{bmatrix}$$

This is the same as the example problem in class so you can check that your work is correct. Please redo the parts from in class.

Other Notes:

1. You are welcome to use Symbolab.com to help in checking your calculation for eigenvalues and vectors.
2. You can use PPlane to plots phase planes (or direction fields) for each of the problems 1, 3, 5, 8, 10. Take some time and see if you notice how the eigenvalues seem to be represented in the direction field.