

Problems Day 35, M 4/1/2024

Topic 16: Eigenstuff (day 2)

Jeremy Orloff

Problem 1. Suppose A is a 3×3 matrix with eigenvalue/vector pairs

$$\begin{array}{r} \lambda = \\ \mathbf{v} = \end{array} \begin{array}{ccc} 2 & 3 & 5 \\ \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix} & \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} & \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \end{array}$$

- (a) Give the general solution to $\mathbf{x}' = A\mathbf{x}$, $\left(\mathbf{x} = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \right)$.
- (b) Give the diagonalized form of A
- (c) Give A^5 , A^{-1} , $\det(A)$.
- (d) Give a change of variable that decouples the system in Part (a). Write the decoupled system in matrix form and solve it.

Problem 2. Repeat problem (1) for the matrix $\begin{bmatrix} 5 & 3 \\ 1 & 3 \end{bmatrix}$.

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ES.1803 Differential Equations

Spring 2024

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