

Math 217 - October 26, 2010

- Systems (eigenvalues, eigenvectors)

1. Given the eigenvectors and eigenvalues to matrix A , find the general solution to the equation $X' = AX$. $A = \begin{bmatrix} 1 & 3 \\ -3 & 1 \end{bmatrix}$, $\lambda_1 = 1 - 3i$, $v_1 = [1, -i]^T$, $\lambda_2 = 1 + 3i$, $v_2 = [1, i]^T$.
2. Given the eigenvectors and eigenvalues to matrix A , find the general solution to the equation $X' = AX$. $A = \begin{bmatrix} 1 & -10 \\ 1 & 3 \end{bmatrix}$, $\lambda_1 = 2 - 3i$, $v_1 = [10, -1 + 3i]^T$, $\lambda_2 = 2 + 3i$, $v_2 = [10, -1 - 3i]^T$.

Lecture Problems

3. Two tanks are filled with salt water and connected by pipes. One pipe pumps brine from tank 1 to tank 2 at a rate of 10 gals/min. Another pipe pumps brine from tank 2 to tank 1 also at a rate of 10 gals/min.

The initial volumes in tanks are 50 gal and 25 gals. The initial amounts of salt in tanks are 15 lbs and none.

Set up (and then solve) the system.