

CAAM 336 · DIFFERENTIAL EQUATIONS

Homework 22

Posted Monday 30 September 2013. Due 5pm Wednesday 9 October 2013.

22. [25 points] Suppose that

$$\mathbf{A} = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & -1 & 0 \end{bmatrix}.$$

- (a) Compute by hand the eigenvalues and eigenvectors of this matrix.
- (b) Choose three eigenvectors of \mathbf{A} , one corresponding to each eigenvalue of \mathbf{A} , and verify by hand that these eigenvectors are orthogonal.
- (c) Solve the linear system $\mathbf{Ax} = \mathbf{b}$ using the spectral method, where

$$\mathbf{b} = \begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}.$$