

Homework #4

Math 2010
Due Wednesday, October 20

You must **show all work** to receive full credit. **No work = no credit.**

1. Find the eigenvalues and eigenvectors of the following matrices.

(a) (2 points) $A = \begin{bmatrix} 2 & -12 \\ 1 & -5 \end{bmatrix}$

(b) (2 points) $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$

(c) (3 points) $A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 5 & -10 \\ 1 & 0 & 2 & 0 \\ 1 & 0 & 0 & 3 \end{bmatrix}$

2. (1 point) Find the eigenvalues (only) of A^9 for

$$A = \begin{bmatrix} 1 & 3 & 7 & 11 \\ 0 & \frac{1}{2} & 3 & 8 \\ 0 & 0 & 0 & 4 \\ 0 & 0 & 0 & 2 \end{bmatrix}$$

3. (1 point each) Assume A is a 6×6 matrix. Given each characteristic equation for A , determine whether or not the system $Ax = b$ has a unique solution. Why or why not?

(a) $\lambda^2(\lambda - 1)(\lambda - 2)^3 = 0$

(b) $(\lambda - 1)(\lambda + 1)(\lambda - 3)^4 = 0$