## Eigenvectors

solving the NULL space of A - Ai

$$A - A \cdot I = \begin{bmatrix} 1 & 2 & 7 & 7 & 7 \\ 2 & 1 & 1 & 1 \\ 2 & 2 & 1 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 2 & 2 & 7 & 7 & 7 \\ 2 & 2 & 1 & 1 \\ 2 & 2 & 1 & 1 \end{bmatrix}$$

$$x_{1+1} = 0$$

$$\lambda_{2}=3$$

$$A-A_{2}I = \begin{bmatrix} 12\\21 \end{bmatrix} - \begin{bmatrix} 30\\03 \end{bmatrix}$$

$$= \begin{bmatrix} -2&2\\2-2 \end{bmatrix} \xrightarrow{R} \begin{bmatrix} +1/1\\00 \end{bmatrix}$$



$$\lambda_1 = 1$$
  $\lambda_2 = 13$ 

eigenvectors

 $\Lambda_{\nu}$   $\Lambda_{\nu}$ 

$$/\exists X = / ()$$

check DI

$$\begin{bmatrix} 1 & 2 & 3 & 3 & 3 & 3 \\ 2 & 1 & 3 & 3 & 3 & 3 \end{bmatrix} = -1 \begin{bmatrix} -1 & 3 & 3 & 3 \\ -1 & 3 & 3 & 3 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} 5 & 4 \\ 45 \end{bmatrix}$$

Find A's and eigenvectors,

$$A A X = \lambda \lambda X$$

$$A^2 X = \lambda^2 X$$

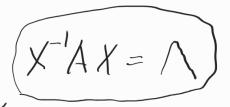
Raise Ak, xk, X Stays the same

eigrals (AB) + eigrals of A or B

## Eigenve ctors

Diagonalizing A n independent

X is montrix of eigen vecs





$$X X^{-1}A X = X \Lambda$$

$$A X = X \wedge X^{-1}$$

$$A = X / X^{-1}$$



$$X = \begin{bmatrix} -1 & 1 \\ 1 & 1 \end{bmatrix} \qquad A = \begin{bmatrix} -1 & 0 \\ 6 & 3 \end{bmatrix} \qquad x^{-1} = \begin{bmatrix} -.5 & .5 \\ .5 & .5 \end{bmatrix}$$

$$\sqrt{\begin{bmatrix} 12 \\ 21 \end{bmatrix}} = \begin{bmatrix} -11 \\ 11 \end{bmatrix} \begin{bmatrix} -10 \\ 03 \end{bmatrix} \begin{bmatrix} -.5.5 \\ .5 \end{bmatrix}$$

$$X = \begin{bmatrix} 1 & -1 \end{bmatrix}$$

order doesn't matter as long as N's correspond

$$\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 6 & 3 \end{bmatrix} \begin{bmatrix} .5 & -.5 \\ .5 & .5 \end{bmatrix}$$
 to eightes

$$A = X \wedge X^{-1}$$

$$A^{2} = X \wedge X^{-1} X \wedge X^{-1}$$

$$= \times \wedge \wedge \times^{-1}$$

$$=$$
  $\times \wedge^2 \times^{-1}$ 

$$A^{K} = XA^{K}X^{-1}$$

$$A^{2} = \begin{bmatrix} 54 \\ 45 \end{bmatrix}$$

$$X = \begin{bmatrix} -1 & 1 \\ 1 & 1 \end{bmatrix}, \Lambda = \begin{bmatrix} (-1)^2 & 0 \\ 0 & 3^2 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 \\ 0 \end{bmatrix}$$

$$A - \lambda J = \begin{bmatrix} 2 - \lambda & 1 \\ 0 & 2 - \lambda \end{bmatrix}$$

$$(2 - \lambda)^{2}$$

$$\lambda_{1} = \lambda_{2}^{2}$$

$$\lambda_{1} = \lambda_{2}^{2}$$
Multiplicity
$$\lambda_{2}$$

$$\begin{bmatrix} 2-2 & 1 \\ 0 & 2-2 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

$$A = \begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix} \qquad X = \begin{bmatrix} 1 & 1 \\ 0 & 6 \end{bmatrix} \quad (ad-bc=9)$$

We can't set 
$$A=X\Lambda X^{-1}$$