Multivar Quiz #10 Saaif Ahmed

Wednesday, December 2, 2020

Honor Pledge:

"I have neither given nor received any illegal aid on this exam"

-Saaif Ahmed 12/2/20

Problem 5

Compute the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 3 & -1 & 2 \\ 0 & 3 & 2 \\ 0 & 3 & 4 \end{bmatrix}$

$$\begin{bmatrix} 3-\lambda & -1 & 2 \\ 0 & 3-\lambda & 2 \\ 0 & 3 & 4-\lambda \end{bmatrix}$$

$(3-\lambda)(\lambda^2 - 7\lambda + 12 - 6) = 0$

$\boldsymbol{\lambda = 3, 6, 1}$

Eigen matrices

$A1 = \begin{bmatrix} 0 & -1 & 2 \\ 0 & 0 & 2 \\ 0 & 3 & 1 \end{bmatrix}$

$A2 = \begin{bmatrix} -3 & -1 & 2 \\ 0 & -3 & 2 \\ 0 & 3 & -2 \end{bmatrix}$

$A3 = \begin{bmatrix} 2 & -1 & 2 \\ 0 & 2 & 2 \\ 0 & 3 & 3 \end{bmatrix}$

Reduce row echelon the eigen matrices to get eigen vectors.

For $A1 = \begin{bmatrix} 0 & -1 & 2 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 3 & 1 & 0 \end{bmatrix}$

$\boldsymbol{E1 = [v1 \quad 0 \quad 0]}$

For $A2 = \left[\begin{array}{ccc|c} -3 & -1 & 2 & 0 \\ 0 & -3 & 2 & 0 \\ 0 & 3 & -2 & 0 \end{array}\right]$

$\boldsymbol{E2 = [12 \quad -2 \quad 3]}$

For $A3 = \left[\begin{array}{ccc|c} 2 & -1 & 2 & 0 \\ 0 & 2 & 2 & 0 \\ 0 & 3 & 3 & 0 \end{array}\right]$

$\boldsymbol{E3 = [1 \quad 2 \quad 2]}$