Soal untuk Tutorial 9 Aljali SI dan IF TA 2022/2023

1. Confirm by multiplication that x is an eigen vector of A, and find the corresponding eigenvalue.

$$A = \begin{bmatrix} 4 & 0 & 1 \\ 2 & 3 & 2 \\ 1 & 0 & 4 \end{bmatrix} ; \; x = \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$$

2. Find the characteristic equation, the eigenvalues, and bases for the eigenspaces of the matrix.

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

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

3. Find the characteristic equation, the eigen values, and bases for the eigenspaces of the matrix.

$$\begin{bmatrix} 6 & 3 & -8 \\ 0 & -2 & 0 \\ 1 & 0 & -3 \end{bmatrix}$$

4. Show that A and B are not similar matrices

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}, \; B = \begin{bmatrix} 1 & 2 & 0 \\ \frac{1}{2} & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

5. Find a matrix P that diagonalizes A, and check your work by computing $P^{-1} AP$.

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

6. The characteristic equation of a matrix A is given. Find the size of the matrix and the possible dimensions of its eigenspaces

(a) $(\lambda - 1)(\lambda + 3)(\lambda - 5) = 0$

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

7. Compute the matrix A^{10}

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