Tugas Aljabar Linear Matrix

1. Yasmina Syahidah
2. Shofwan Fikrul Huda
3. Yustinus Hendi Setyawan

1. Menentukan matrix A dan B

$$A = \begin{bmatrix} -1 & -2 & -3 \\ -4 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix} \qquad B = \begin{bmatrix} -3 & 15 & 9 & -6 \\ -2 & 16 & -8 & 10 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & -1 \end{bmatrix}$$

2. Menentukan OKE atau OBE 3 buah

$$A = \begin{bmatrix} -1 & -2 & -3 \\ -4 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix}_{H_{13}(A)} \qquad A = \begin{bmatrix} 2 & 3 & 4 \\ -4 & 0 & 1 \\ -1 & -2 & -3 \end{bmatrix}$$

$$B = \begin{bmatrix} -3 & 15 & 9 & -6 \\ -2 & 16 & -8 & 10 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & -1 \end{bmatrix}_{K_{41(-3)}(B)} \qquad B = \begin{bmatrix} -3 & 15 & 9 & 3 \\ -2 & 16 & -8 & 16 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & 20 \end{bmatrix}$$

$$A = \begin{bmatrix} -1 & -2 & -3 \\ -4 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix}_{H_{2(1)3(2)}(A)} \qquad A = \begin{bmatrix} -1 & -2 & -3 \\ 0 & 6 & 9 \\ 2 & 3 & 4 \end{bmatrix}$$

3. Menentukan equivalen antara matrix A dengan C dan B dengan D

$$A = \begin{bmatrix} -1 & -2 & -3 \\ -4 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix} \qquad C = \begin{bmatrix} -1 & -2 & -3 \\ 2 & 3 & 4 \\ -2 & 4 & 7 \end{bmatrix}$$

$$A = \begin{bmatrix} -1 & -2 & -3 \\ -4 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix}_{H_{23}(A)} \qquad A = \begin{bmatrix} -1 & -2 & -3 \\ 2 & 3 & 4 \\ -4 & 0 & 1 \end{bmatrix}_{H_{3(1)1(-1)}} \qquad A = \begin{bmatrix} -1 & -2 & -3 \\ 2 & 3 & 4 \\ -2 & 4 & 7 \end{bmatrix}$$

Jadi A~C

$$B = \begin{bmatrix} -3 & 15 & 9 & -6 \\ -2 & 16 & -8 & 10 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & -1 \end{bmatrix} \qquad D = \begin{bmatrix} -6 & 15 & 33 & -2 \\ 10 & 16 & 0 & -2 \\ 5 & 2 & -8 & 0 \\ -1 & 1 & 17 & -7 \end{bmatrix}$$

$$B = \begin{bmatrix} -3 & 15 & 9 & -6 \\ -2 & 16 & -8 & 10 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & -1 \end{bmatrix} \qquad B = \begin{bmatrix} -6 & 15 & 9 & -2 \\ 10 & 16 & -8 & -2 \\ 5 & 2 & -5 & 0 \\ -1 & 1 & 8 & -7 \end{bmatrix} \qquad B = \begin{bmatrix} -6 & 15 & 33 & -2 \\ 10 & 16 & 0 & -2 \\ 5 & 2 & -8 & 0 \\ -1 & 1 & 17 & -7 \end{bmatrix}$$

$K_{14}(B)$ $\qquad\qquad$ $K_{3(2)2(1)}(B)$

Jadi, B~D

4. Menentukan determinan matriks A menggunakan metode sarrus dan B menggunakan metode kofaktor.

a). Menentukan determinan matriks A:

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

Menggunakan metode sarrus

(1x0x4)+(-2x1x2)+(-3x-4x3)-(2x0x(-3))-(3x1x(-1))-(4x(-4)x(-2))=0+4+36-0+3-32=11

Jadi, det(A)=11

b). Menggunakan metode kofaktor

$$B = \begin{bmatrix} -3 & 15 & 9 & -6 \\ -2 & 16 & -8 & 10 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & -1 \end{bmatrix}$$

$b_{11}K_{11} + b_{12}K_{12} + b_{13}K_{13} + b_{14}K_{14} =$

$$-3\begin{vmatrix} 16 & -8 & 10 \\ 2 & -5 & 5 \\ 1 & 8 & -1 \end{vmatrix} - 15\begin{vmatrix} -2 & -8 & 10 \\ 0 & -5 & 5 \\ -7 & 8 & -1 \end{vmatrix} + 9\begin{vmatrix} -2 & 16 & 10 \\ 0 & 2 & 5 \\ -7 & 1 & -1 \end{vmatrix} - (-6)\begin{vmatrix} -2 & 16 & -8 \\ 0 & 2 & -5 \\ -7 & 1 & 8 \end{vmatrix}$$

$$\begin{vmatrix} 16 & -8 & 10 \\ 2 & -5 & 5 \\ 1 & 8 & -1 \end{vmatrix} = 16(-35)-(-8)(-7)+10(21) = -406$$

$$\begin{vmatrix} -2 & -8 & 10 \\ 0 & -5 & 5 \\ -7 & 8 & -1 \end{vmatrix} = (-2)(-35)-(-8)(35)+10(-35) = 0$$

$$\begin{vmatrix} -2 & 16 & 10 \\ 0 & 2 & 5 \\ -7 & 1 & -1 \end{vmatrix} = (-2)(-7)-16(35)+10(14)= -406$$

$$\begin{vmatrix} -2 & 16 & -8 \\ 0 & 2 & -5 \\ -7 & 1 & 8 \end{vmatrix} = (-2)(21)-16(-35)+(-8)(14)= 406$$

(-3)(-406)-15(0)+9(-406)-(-6)(406)= 406(3-9+6)= 406.0 = 0

Jadi, det(B)=0

5. Menentukan Rank Matriks

$$A = \begin{bmatrix} -1 & -2 & -3 \\ -4 & 0 & 1 \\ 2 & 3 & 4 \end{bmatrix}$$ karna tidak bisa dicari lagi, maka Rank (A)= 3

$$B = \begin{bmatrix} -3 & 15 & 9 & -6 \\ -2 & 16 & -8 & 10 \\ 0 & 2 & -5 & 5 \\ -7 & 1 & 8 & -1 \end{bmatrix}_{B_{3(1)4(1)}} \quad B = \begin{bmatrix} -3 & 15 & 3 & -6 \\ -2 & 16 & 2 & 10 \\ 0 & 2 & 0 & 5 \\ -7 & 1 & 7 & -1 \end{bmatrix}_{B_{1(1)3(1)}} \quad B = \begin{bmatrix} 0 & 15 & 3 & -6 \\ 0 & 16 & 2 & 10 \\ 0 & 2 & 0 & 5 \\ 0 & 1 & 7 & -1 \end{bmatrix}$$

Maka, Rank(B)=3