

Upload jawaban tugas SPL Metode Matriks

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TUGAS 6 E-LEARNING MATEMATIKA TERAPAN

Selesaikan persamaan linear dg metode Matriks

$$\begin{aligned} \textcircled{1} \quad & 2x + y - z = 4 \\ & x + y + z = 3 \\ & 2x - 2y + 4z = 6 \end{aligned}$$

Jawab :

$$\begin{aligned} |A| &= \begin{vmatrix} 2 & 1 & -1 \\ 1 & 1 & 1 \\ 2 & -2 & 4 \end{vmatrix} = +2 \begin{vmatrix} 1 & 1 \\ -2 & 4 \end{vmatrix} - 1 \begin{vmatrix} 1 & 1 \\ 2 & 4 \end{vmatrix} + (-1) \begin{vmatrix} 1 & 1 \\ 2 & -2 \end{vmatrix} \\ &= 2(4 - (-2)) - 1(4 - 2) - 1(-2 - 2) \\ &= 12 - 2 + 4 = 14 \end{aligned}$$

Kofaktor :

$$A_{11} = + \begin{vmatrix} 1 & 1 \\ -2 & 4 \end{vmatrix} = 4 - (-2) = 6$$

$$A_{12} = - \begin{vmatrix} 1 & 1 \\ 2 & 4 \end{vmatrix} = -(4 - 2) = -2$$

$$A_{13} = + \begin{vmatrix} 1 & 1 \\ 2 & -2 \end{vmatrix} = -2 - 2 = -4$$

$$A_{21} = - \begin{vmatrix} 1 & -1 \\ -2 & 4 \end{vmatrix} = -(4 - 2) = -2$$

$$A_{22} = + \begin{vmatrix} 2 & -1 \\ 2 & 4 \end{vmatrix} = 8 - (-2) = 10$$

$$A_{23} = - \begin{vmatrix} 2 & 1 \\ 2 & -2 \end{vmatrix} = -(-4 - 2) = 6$$

$$A_{31} = + \begin{vmatrix} 1 & -1 \\ 1 & 1 \end{vmatrix} = 1 - (-1) = 2$$

$$A_{32} = - \begin{vmatrix} 2 & -1 \\ 1 & 1 \end{vmatrix} = -(2 - (-1)) = -3$$

$$A_{33} = + \begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix} = 2 - 1 = 1$$

$$\therefore C = \begin{bmatrix} 6 & 2 & -4 \\ -2 & 10 & 6 \\ 2 & -3 & 1 \end{bmatrix} \quad \therefore \text{Adj } A = C^T = \begin{bmatrix} 6 & -2 & 2 \\ 2 & 10 & -3 \\ -4 & 6 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{\text{Adj } A}{|A|} = \frac{1}{14} \begin{bmatrix} 6 & -2 & 2 \\ 2 & 10 & -3 \\ -4 & 6 & 1 \end{bmatrix}$$

$$X = A^{-1} \cdot b$$

$$= \frac{1}{14} \begin{bmatrix} 6 & -2 & 2 \\ -2 & 10 & -3 \\ -4 & 6 & 1 \end{bmatrix} \begin{bmatrix} 4 \\ 3 \\ 6 \end{bmatrix}$$

$$= \frac{1}{14} \begin{bmatrix} (6 \times 4) + (-2 \times 3) + (2 \times 6) \\ (-2 \times 4) + (10 \times 3) + (-3 \times 6) \\ (-4 \times 4) + (6 \times 3) + (1 \times 6) \end{bmatrix} = \frac{1}{14} \begin{bmatrix} 24 - 6 + 12 \\ -8 + 30 - 18 \\ -16 + 18 + 6 \end{bmatrix} = \frac{1}{14} \begin{bmatrix} 30 \\ 4 \\ 8 \end{bmatrix}$$

$$= \begin{bmatrix} 2,14 \\ 0,28 \\ 0,57 \end{bmatrix} \quad \therefore \text{Jadi } \begin{aligned} X_1 &= 2,14 \\ X_2 &= 0,28 \\ X_3 &= 0,57 \end{aligned}$$

$$\textcircled{2} \quad \begin{aligned} 2x + y - 2z &= 7 \\ x - 2y + z &= 1 \\ 3x + 5y - z &= 0 \end{aligned}$$

Jawab:

$$\begin{aligned} |A| &= \begin{vmatrix} 2 & 1 & -2 \\ 1 & -2 & 1 \\ 3 & 5 & -1 \end{vmatrix} = +2 \begin{vmatrix} -2 & 1 \\ 5 & -1 \end{vmatrix} - 1 \begin{vmatrix} 1 & 1 \\ 3 & -1 \end{vmatrix} + (-2) \begin{vmatrix} 1 & -2 \\ 3 & 5 \end{vmatrix} \\ &= 2(2 - 5) - 1(-1 - 3) - 2(5 - (-6)) \\ &= -6 + 4 - 22 = -24 \end{aligned}$$

Kofaktor :

$$A_{11} = + \begin{vmatrix} -2 & 1 \\ 5 & -1 \end{vmatrix} = (2 - 5) = -3$$

$$A_{12} = - \begin{vmatrix} 1 & 1 \\ 3 & -1 \end{vmatrix} = -(-1 - 3) = 4$$

$$A_{13} = + \begin{vmatrix} 1 & -2 \\ 3 & 5 \end{vmatrix} = 5 - (-6) = 11$$

$$A_{21} = - \begin{vmatrix} 1 & -2 \\ 5 & -1 \end{vmatrix} = -(-1 - (-10)) = -9$$

$$A_{22} = + \begin{vmatrix} 2 & -2 \\ 3 & -1 \end{vmatrix} = (-2 - (-6)) = 4$$

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$$A_{31} = + \begin{vmatrix} 1 & -2 \\ -2 & 1 \end{vmatrix} = 1 - 4 = -3$$

$$A_{32} = - \begin{vmatrix} 2 & -2 \\ 1 & 1 \end{vmatrix} = -(2 - (-2)) = -4$$

$$A_{33} = + \begin{vmatrix} 2 & 1 \\ 1 & -2 \end{vmatrix} = (-4 - 1) = -5$$

$$\therefore c \begin{bmatrix} -3 & 4 & 11 \\ -9 & 4 & -7 \\ -3 & -4 & -5 \end{bmatrix} \quad \therefore \text{Adj } A = c^T \begin{bmatrix} -3 & -9 & -3 \\ 4 & 4 & -4 \\ 11 & -7 & -5 \end{bmatrix}$$

$$A^{-1} = \frac{\text{Adj } A}{|A|} = \frac{1}{-24} \begin{bmatrix} -3 & -9 & -3 \\ 4 & 4 & -4 \\ 11 & -7 & -5 \end{bmatrix}$$

$$X = A^{-1} \cdot b$$

$$= \frac{1}{-24} \begin{bmatrix} -3 & -9 & -3 \\ 4 & 4 & -4 \\ 11 & -7 & -5 \end{bmatrix} \begin{bmatrix} 7 \\ 1 \\ 0 \end{bmatrix} = \frac{1}{-24} \begin{bmatrix} (-3 \times 7) + (-9 \times 1) + (-3 \times 0) \\ (4 \times 7) + (4 \times 1) + (-4 \times 0) \\ (11 \times 7) + (-7 \times 1) + (-5 \times 0) \end{bmatrix}$$

$$= \frac{1}{-24} \begin{bmatrix} -21 - 9 - 0 \\ 28 + 4 + 0 \\ 77 - 7 - 0 \end{bmatrix} = \frac{1}{-24} \begin{bmatrix} -30 \\ 32 \\ 70 \end{bmatrix} = \begin{bmatrix} 1,25 \\ -1,3 \\ -2,9 \end{bmatrix}$$

$$\text{Jadi : } X_1 = 1,25$$

$$X_2 = -1,3$$

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