Bhimantoro Suryo Admodjo

170535629519

S1 TI 17A

1. Diketahui SPL $\begin{cases} w + 3x - 2y - 3z = 2 \\ 3w - 4x + y - 2z = 0 \\ 4w + 2x - 3y + z = 1 \\ 2w - x + 4y - 4z = 3 \end{cases}$ tentukan nilai varibel x!
2. Diketahui SPL $\begin{cases} x + 2y - 3z = 0 \\ 4x - 3y + 2z = 1 \\ x + y - 2z = 2 \end{cases}$ tentukan nilai x, y, dan z!

1. $\left[\begin{array}{cccc|c} 1 & 3 & -2 & -3 & 2 \\ 3 & -4 & 1 & -2 & 0 \\ 4 & 2 & -3 & 1 & 1 \\ 2 & -1 & 4 & -4 & 3 \end{array}\right]$

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

Cari determinan matriks A

$A = \begin{bmatrix} 1 & 3 & -2 & -3 \\ 3 & -4 & 1 & -2 \\ 4 & 2 & -3 & 1 \\ 2 & -1 & 4 & -4 \end{bmatrix}$

$R_2 = (-3)R_1 + R_2$

$R_3 = (-4)R_1 + R_3$

$R_4 = (-2)_{R1} + R_4$

$\det A = \begin{bmatrix} 1 & 3 & -2 & -3 \\ 0 & -13 & 7 & 7 \\ 0 & -10 & 5 & 13 \\ 0 & -7 & 8 & 2 \end{bmatrix}$

$R_3 = \left(-\frac{10}{13}\right) R_2 + R_3$

$R_4 = \left(-\frac{7}{13}\right) R_2 + R_4$

$\det A = \begin{bmatrix} 1 & 3 & -2 & -3 \\ 0 & -13 & 7 & 7 \\ 0 & 0 & -\frac{5}{13} & \frac{99}{13} \\ 0 & 0 & \frac{55}{13} & -\frac{23}{13} \end{bmatrix}$

$R_4 = 11R_3 + R_4$

$\det A = \begin{bmatrix} 1 & 3 & -2 & -3 \\ 0 & -13 & 7 & 7 \\ 0 & 0 & -\frac{5}{13} & \frac{99}{13} \\ 0 & 0 & 0 & 82 \end{bmatrix}$

$\det A = 1.(-13).\left(-\frac{5}{13}\right).82$

$\det A = 410$

Cari determinan matriks x

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

$R_2 = (-3)R_1 + R_2$

$R_3 = (-4)R_1 + R_3$

$R_4 = (-2)R_1 + R_4$

$$\det x = \begin{bmatrix} 1 & 2 & -2 & -3 \\ 0 & -6 & 7 & 7 \\ 0 & -7 & 5 & 13 \\ 0 & -1 & 8 & 2 \end{bmatrix}$$

$R_3 = \left(-\frac{7}{6}\right) R_2 + R_3$

$R_4 = \left(-\frac{1}{6}\right) R_2 + R_4$

$$\det x = \begin{bmatrix} 1 & 2 & -2 & -3 \\ 0 & -6 & 7 & 7 \\ 0 & 0 & -\frac{19}{6} & \frac{29}{6} \\ 0 & 0 & \frac{41}{6} & \frac{5}{6} \end{bmatrix}$$

$R_4 = \left(\frac{41}{19}\right) R_3 + R_4$

$$\det x = \begin{bmatrix} 1 & 2 & -2 & -3 \\ 0 & -6 & 7 & 7 \\ 0 & 0 & -\frac{19}{6} & \frac{29}{6} \\ 0 & 0 & 0 & \frac{214}{19} \end{bmatrix}$$

$\det x = 1.(-6).\left(-\frac{19}{6}\right).\frac{214}{19}$

$\det x = 214$

cari nilai x dengan $\frac{\det x}{\det A}$

$x = \frac{\det x}{\det A} = \frac{214}{410} = \frac{107}{205}$

2. $$\left[\begin{array}{ccc|c} 1 & 2 & -3 & 0 \\ 4 & -3 & 2 & 1 \\ 1 & 1 & -2 & 2 \end{array}\right]$$

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

Cari determinan matriks B

$$B = \begin{bmatrix} 1 & 2 & -3 \\ 4 & -3 & 2 \\ 1 & 1 & -2 \end{bmatrix} \begin{matrix} 1 & 2 \\ 4 & -3 \\ 1 & 1 \end{matrix}$$

$\det B = \big((1 \times -3 \times -2) + (2 \times 2 \times 1) + (-3 \times 4 \times 1)\big) - \big((-3 \times -3 \times 1) +$

$(1 \times 2 \times 1) + (2 \times 4 \times -2)\big)$

$\det B = \big(6 + 4 + (-12)\big) - \big(9 + 2 + (-16)\big)$

$\det B = (-2) - (-5)$

$\det B = 3$

Cari determinan matriks x

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

$\det x = \big((0 \times -3 \times -2) + (2 \times 2 \times 2) + (-3 \times 1 \times 1)\big) - \big((-3 \times -3 \times 2) +$

$(0 \times 2 \times 1) + (2 \times 1 \times -2)\big)$

$\det x = \big(0 + 8 + (-3)\big) - \big(18 + 0 + (-4)\big)$

$det\ x = 5 - 14$

$det\ x = -9$

cari nilai x dengan $\frac{\det x}{\det B}$

$x = -\frac{9}{3} = -3$

cari determinan matriks y

$$y = \begin{bmatrix} 1 & 0 & -3 \\ 4 & 1 & 2 \\ 1 & 2 & -2 \end{bmatrix} \begin{matrix} 1 & 0 \\ 4 & 1 \\ 1 & 2 \end{matrix}$$

$\det y = \big((1 \times 1 \times -2) + (0 \times 2 \times 1) + (-3 \times 4 \times 2)\big) - \big((-3 \times 1 \times 1) +$

$(1 \times 2 \times 2) + (0 \times 4 \times -2)\big)$

$\det y = \big((-2) + 0 + (-24)\big) - \big((-3) + 4 + 0\big)$

$\det y = (-26) - 1$

$\det y = -27$

cari nilai y dengan $\frac{\det y}{\det B}$

$y = -\frac{27}{3} = -9$

cari determinan matriks z

$$z = \begin{bmatrix} 1 & 2 & 0 \\ 4 & -3 & 1 \\ 1 & 1 & 2 \end{bmatrix} \begin{matrix} 1 & 2 \\ 4 & -3 \\ 1 & 1 \end{matrix}$$

$\det z = ((1 \times -3 \times 2) + (2 \times 1 \times 1) + (0 \times 4 \times 1) - ((0 \times -3 \times 1) +$

$(1 \times 1 \times 1) + (2 \times 4 \times 2))$

$\det z = \big((-6) + 2 + 0\big) - (0 + 1 + 16)$

$\det z = (-4) - 17$

$\det z = -21$

$cari\ nilai\ z\ dengan\ \frac{\det z}{\det B}$

$z = -\frac{21}{3} = -7$

Jadi, nilai variabel SPL $\begin{cases} x + 2y - 3z = 0 \\ 4x - 3y + 2z = 1 \\ x + y - 2z = 2 \end{cases}$ yaitu : $x = -3, y = -9, z = -7$