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Kelas : IF4A

1. Misalkan diberikan SPL sebagai berikut dengan eliminasi Gauss:

$$\begin{aligned}x + y + 2z &= 9 \\ 2x + 4y - 3z &= 1 \\ 3x + 6y - 5z &= 0\end{aligned}$$

2. Misalkan diberikan SPL sebagai berikut dengan eliminasi Gauss Jordan:

$$\begin{aligned}x + y - z &= 6 \\ 3x - 4y + 2z &= -2 \\ 2x + 5y + z &= 0\end{aligned}$$

Jawab

$$\begin{aligned}1. \left[\begin{array}{cccc|c} 1 & 1 & 2 & 9 & i \\ 2 & 4 & -3 & 1 & ii \\ 3 & 6 & -5 & 0 & iii \end{array} \right] \\ i(-2) + ii = 1(-2) + 2 = 0 \\ 1(-2) + 4 = 2 \\ 2(-2) - 3 = -7 \\ 9(-2) + 1 = -17\end{aligned}$$

$$\begin{aligned}\left[\begin{array}{cccc|c} 1 & 1 & 2 & 9 & \\ 0 & 2 & -7 & -17 & \\ 3 & 6 & -5 & 0 & \end{array} \right] \\ i(-3) + iii = 1(-3) + 3 = 0 \\ 1(-3) + 6 = 3 \\ 2(-3) - 5 = -11 \\ 9(-3) + 0 = -27\end{aligned}$$

$$\begin{aligned}\left[\begin{array}{cccc|c} 1 & 1 & 2 & 9 & \\ 0 & 2 & -7 & -17 & \\ 0 & 3 & -11 & -27 & \end{array} \right] \\ ii\left(\frac{1}{2}\right) = 0\left(\frac{1}{2}\right) = 0 \\ 2\left(\frac{1}{2}\right) = 1 \\ -7\left(\frac{1}{2}\right) = -\frac{7}{2} \\ -17\left(\frac{1}{2}\right) = -\frac{17}{2}\end{aligned}$$



$$\begin{bmatrix} 1 & 1 & 2 & 9 \\ 0 & 1 & -\frac{7}{2} & -\frac{17}{2} \\ 0 & 3 & -11 & -27 \end{bmatrix}$$

$$\begin{aligned} ii(-3)+iii &= 1(-3)+3=0 \\ -\frac{7}{2}(-3)-11 &= -\frac{1}{2} \\ -\frac{17}{2}(-3)-27 &= -\frac{3}{2} \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 2 & 9 \\ 0 & 1 & -\frac{7}{2} & -\frac{17}{2} \\ 0 & 0 & -\frac{1}{2} & -\frac{3}{2} \end{bmatrix}$$

$$\begin{aligned} iii(-2) &= -\frac{1}{2}(-2)=1 \\ -\frac{3}{2}(-2) &= 3 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & 2 & 9 \\ 0 & 1 & -\frac{7}{2} & -\frac{17}{2} \\ 0 & 0 & 1 & 3 \end{bmatrix}$$

solusi sistem diperoleh dengan teknik penyulihan mundur sebagai berikut :
 $z=3$

$$\begin{aligned} y - \frac{7}{2}z &= -\frac{17}{2} \\ y - \frac{7}{2}(3) &= -\frac{17}{2} \\ y &= \left(-\frac{17}{2}\right) + \frac{21}{2} \\ y &= 2 \end{aligned}$$

$$\begin{aligned} x+y+2z &= 9 \\ x+2+2(3) &= 9 \\ x+8 &= 9 \\ x &= 1 \end{aligned}$$

Diperoleh penyelesaian $x=1, y=2, z=3$

$$\begin{aligned} 2. \begin{bmatrix} 1 & 1 & -1 & 6 \\ 3 & -4 & 2 & -2 \\ 2 & 5 & 1 & 0 \end{bmatrix} \begin{bmatrix} i \\ ii \\ iii \end{bmatrix} \\ i(-3)+ii &= 1(-3)+3=0 \\ 1(-3)-4 &= -7 \end{aligned}$$



$$\begin{aligned} -1(-3)+2 &= 5 \\ 6(-3)-2 &= -20 \end{aligned}$$

$$\begin{bmatrix} 1 & 1 & -1 & 6 \\ 0 & -7 & 5 & -20 \\ 2 & 5 & 1 & 0 \end{bmatrix}$$

$$i(-2)+iii=1(-2)+2=0$$

$$1(-2)+5=3$$

$$-1(-2)+1=3$$

$$6(-2)+0=-12$$

$$\begin{bmatrix} 1 & 1 & -1 & 6 \\ 0 & -7 & 5 & -20 \\ 0 & 3 & 3 & -12 \end{bmatrix}$$

$$ii\left(-\frac{1}{7}\right)=-7\left(-\frac{1}{7}\right)=1$$

$$5\left(-\frac{1}{7}\right)=-\frac{5}{7}$$

$$-20\left(-\frac{1}{7}\right)=\frac{20}{7}$$

$$\begin{bmatrix} 1 & 1 & -1 & 6 \\ 0 & 1 & -\frac{5}{7} & \frac{20}{7} \\ 0 & 3 & 3 & -12 \end{bmatrix}$$

$$ii(-3)+iii=1(-3)+3=0$$

$$\left(-\frac{5}{7}\right)(-3)+3=\frac{36}{7}$$

$$\left(\frac{20}{7}\right)(-3)-12=-\frac{144}{7}$$

$$\begin{bmatrix} 1 & 1 & -1 & 6 \\ 0 & 1 & -\frac{5}{7} & \frac{20}{7} \\ 0 & 0 & \frac{36}{7} & -\frac{144}{7} \end{bmatrix}$$

$$iii\left(\frac{7}{36}\right)=\frac{36}{7}\left(\frac{7}{36}\right)=1$$

$$\left(-\frac{144}{7}\right)\frac{7}{36}=-4$$

$$\begin{bmatrix} 1 & 1 & -1 & 6 \\ 0 & 1 & -\frac{5}{7} & \frac{20}{7} \\ 0 & 0 & 1 & -4 \end{bmatrix}$$



$$\begin{aligned}
 ii(-1)+i &= 1(-1)+1=0 \\
 -\frac{5}{7}(-1)-1 &= -\frac{2}{7} \\
 \frac{20}{7}(-1)+6 &= \frac{22}{7}
 \end{aligned}$$

$$\begin{bmatrix} 1 & 0 & -\frac{2}{7} & \frac{22}{7} \\ 0 & 1 & -\frac{5}{7} & \frac{20}{7} \\ 0 & 0 & 1 & -4 \end{bmatrix}$$

$$\begin{aligned}
 iii\left(\frac{2}{7}\right)+i &= 1\left(\frac{2}{7}\right)-\frac{2}{7}=0 \\
 -4\left(\frac{2}{7}\right)+\frac{22}{7} &= 2
 \end{aligned}$$

$$\begin{bmatrix} 1 & 0 & 0 & 2 \\ 0 & 1 & -\frac{5}{7} & \frac{20}{7} \\ 0 & 0 & 1 & -4 \end{bmatrix}$$

$$\begin{aligned}
 iii\left(\frac{5}{7}\right)-ii &= 1\left(\frac{5}{7}\right)-\frac{5}{7}=0 \\
 -4\left(\frac{5}{7}\right)+\frac{20}{7} &= 0
 \end{aligned}$$

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

diperoleh penyelesaian $x=2, y=0, z=-4$

