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Sistem Persamaan Linear

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Eliminasi Gauss-Jordan

sistem persamaan linear dalam notasi matriks

$$2x + 3y = 5$$
$$4x + 2y = 6$$

$$\begin{bmatrix} 2 & 3 \\ 4 & 2 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$$

$$3x + 2y + 4z = 5$$
$$2x + 2y + 3z = 4$$

$$\begin{bmatrix} 3 & 2 & 4 \\ 2 & 2 & 3 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$$

$$3x + 2y + 4z = 5$$
$$2x + 2y + 3z = 4$$
$$3x + 2y + 1z = 5$$

$$\begin{bmatrix} 3 & 2 & 4 \\ 2 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \\ 5 \end{bmatrix}$$

$$\mathbf{A}\underline{\boldsymbol{x}} = \underline{\boldsymbol{b}}$$

unknowns

right hand side

Eliminasi Gauss Jordan

$$3x + 2y + 4z = 5$$
$$2x + 2y + 3z = 4$$
$$3x + 2y + 1z = 5$$

$$\begin{bmatrix} 3 & 2 & 4 \\ 2 & 2 & 3 \\ 3 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \\ 5 \end{bmatrix}$$

Eliminasi Gaus Jordan

serangkaian operasi baris elementer

kanonik

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} ? \\ ? \\ ? \end{bmatrix}$$

atau setidaknya berbentuk segitiga atas

$$\begin{bmatrix} a & b & c \\ 0 & d & e \\ 0 & 0 & f \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} ? \\ ? \\ ? \end{bmatrix}$$

Ilustrasi

$$x + 2y + z = 6$$
$$2x + y + 3z = 7$$
$$2x + y - 4z = 0$$

$$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 3 \\ 2 & 1 & -4 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 7 \\ 0 \end{bmatrix}$$

$A \quad \underline{x} = \underline{b}$

$$\left(\begin{array}{ccc|c} 1 & 2 & 1 & 6 \\ 2 & 1 & 3 & 7 \\ 2 & 1 & -4 & 0 \end{array}\right) \xrightarrow[-2B_1 + B_2]{E_{21}(-2)} \left(\begin{array}{ccc|c} 1 & 2 & 1 & 6 \\ 0 & -3 & 1 & -5 \\ 2 & 1 & -4 & 0 \end{array}\right) \xrightarrow[-2B_1 + B_3]{E_{31}(-2)} \left(\begin{array}{ccc|c} 1 & 2 & 1 & 6 \\ 0 & -3 & 1 & -5 \\ 0 & -3 & -6 & -12 \end{array}\right)$$

$$\xrightarrow[-B_2 + B_3]{E_{32}(-1)} \left(\begin{array}{ccc|c} 1 & 2 & 1 & 6 \\ 0 & -3 & 1 & -5 \\ 0 & 0 & -7 & -7 \end{array}\right)$$

$$x + 2y + z = 6 \Rightarrow x + 4 + 1 = 6 \; ; \; \boxed{x = 1}$$
$$-3y + z = -5 \Rightarrow -3y = -6 \; ; \; \boxed{y = 2}$$
$$-7z = -7 \Rightarrow \boxed{z = 1}$$

Solusi

$x = 1$
$y = 2$
$z = 1$

$$\underline{x} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$$

terima kasih

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