

Kasus Minimisasi: Metode Dua Tahap

mis: $Z + 7X_1 + 4X_2 - S_1 = 9$

Angka kendala:

$3X_1 + X_2 + A_1 = 3$
 $4X_1 + 3X_2 - S_1 + A_2 = 6$
 $X_1 + 2X_2 + S_2 = 4$

Tahap I

Iterasi-1

	X_1	X_2	S_1	S_2	A_1	A_2	S	MK	Indikator
Z	7	4	-1	0	0	0	9	9	-
A_1	3	1	0	0	1	0	3	3	1/3
A_2	4	3	-1	0	0	1	6	6	3/4
S_2	1	2	0	1	0	0	4	4	1/4

Iterasi-2

	X_1	X_2	S_1	S_2	A_1	A_2	S	MK	Indikator
Z	0	5/3	-1	0	-7/3	0	2	2	-
X_1	1	1/3	0	0	1/3	0	1	1	3
A_2	0	5/3	-1	0	-4/3	1	2	2	5/5
S_2	0	5/3	0	1	-1/3	0	3	3	5/5

Iterasi-3

	X_1	X_2	S_1	S_2	A_1	A_2	S	MK	Indikator
Z	0	0	0	0	0	0	0	0	0
X_1	1	0	1/5	0	3/5	-1/5	3/5	3/5	3/5
X_2	0	1	-3/5	0	-4/5	3/5	6/5	6/5	6/5
S_2	0	0	1	1	1	-1	1	1	1

Tahap 2:

$X_1 + 1/5 S_1 + 3/5 A_1 - 1/5 A_2 = 3/5$

$X_2 - 3/5 S_1 - 4/5 A_1 + 3/5 A_2 = 6/5$

$S_1 + S_2 + A_1 - A_2 = 1$

$X_1 + 1/5 S_1 = 3/5 \rightarrow X_1 = 3/5 - 1/5 S_1 \dots (1)$

$X_2 - 3/5 S_1 = 6/5 \rightarrow X_2 = 6/5 + 3/5 S_1 \dots (2)$

$S_1 + S_2 = 1 \dots (3)$

Substitusi X_1, X_2 ke Z awal

$Z = 4X_1 + X_2$

$Z = 4(3/5 - 1/5 S_1) + (6/5 + 3/5 S_1)$

$Z = 12/5 - 4/5 S_1 + 6/5 + 3/5 S_1 = 18/5 - 1/5 S_1$

$Z + 1/5 S_1 = 18/5 \dots (4)$

Simplex Tahap II : Dari Pers (1,2,3,4)

	X_1	X_2	S_1	S_2	A_1	A_2	S	MK	Indikator
Z	0	0	1/5	0	0	0	18/5	18/5	- ... (4)
X_1	1	0	1/5	0	3/5	-1/5	3/5	3/5	3 ... (1)
X_2	0	1	-3/5	0	-4/5	3/5	6/5	6/5	- ... (2)
S_2	0	0	1	1	1	-1	1	1	1

Iterasi ke-2

Z
 X_1
 X_2

$$Z = 4 \left(\frac{3}{5} - \frac{1}{5} S_1 \right) + \left(\frac{6}{5} + \frac{2}{5} S_1 \right)$$

$$Z = \frac{12}{5} - \frac{4}{5} S_1 + \frac{6}{5} + \frac{2}{5} S_1 = \frac{18}{5} - \frac{2}{5} S_1$$

$$Z + \frac{2}{5} S_1 = \frac{18}{5} \quad \dots (4)$$

Simplex Table II : Data Pers (1,2,3,4)

variabel baru	x_1	x_2	S_1	S_2	Z_k	hasil
Z	0	0	1/5	0	18/5	... (4)
x_1	1	0	-1/5	0	3	... (1)
x_2	0	1	1/5	0	4	... (2)
S_2	0	0	1	1	1	

Iterasi ke-2

	x_1	x_2	S_1	S_2	Z_k	hasil
Z	0	0	0	0	17/5	
x_1	1	0	0	0	17/5	
x_2	0	1	0	0	17/5	
S_1	0	0	1	0	17/5	

Maka: $Z = \frac{17}{5}$; $x_1 = \frac{2}{5}$; $x_2 = \frac{9}{5}$

$$[A \mid I] \xrightarrow[\text{Gauss-Jordan}]{\text{Gauss}} [I \mid A^{-1}]$$

$$z = 4x_1 + x_2$$

$$3x_1 + x_2 = 3$$

$$4x_1 + 3x_2 \geq 4$$

$$x_1 + 2x_2 \leq 4$$

$$x_1, x_2 \geq 0$$

$$z = 3x_1 + 2x_2 + A_1 + A_2 + \cancel{0.5}$$

für beide

$$x_1 + x_2 = 1$$

$$2x_1 + x_2 \leq 2$$

$$3x_1 + 4x_2 \geq 12$$

$$x_1, x_2 \geq 0$$

$$2x_1 + x_2 + s_1 = 2$$

$$\therefore 3x_1 + 4x_2 - s_2 + A_1 = 12$$

$$x_1 + x_2 + A_2 = 1$$