

Example: Simplex Method

$$\text{Max } z = 3x_1 + 4x_2 + 3x_3$$

s.t

$$3x_1 + 2x_2 + x_3 \leq 960$$

$$5x_1 + 8x_2 + 4x_3 \leq 5000$$

$$3x_1 + 6x_2 + 3x_3 \leq 2400$$

$$x_1, x_2, x_3 \geq 0$$

Solution:

$$3x_1 + 2x_2 + x_3 + s_1 = 960$$

$$5x_1 + 8x_2 + 4x_3 + s_2 = 5000$$

$$3x_1 + 6x_2 + 3x_3 + s_3 = 2400$$

$$-3x_1 - 4x_2 - 3x_3 - 0s_1 - 0s_2 - 0s_3 = 0$$

	X ₁	X ₂	X ₃	S ₁	S ₂	S ₃	R.H.S
S ₁	3	2	1	1	0	0	960
S ₂	5	8	4	0	1	0	5000
S ₃	3	6	3	0	0	1	2400
MAX Z	-3	-4	-3	0	0	0	0

المتغير الداخلي هو X₂

المتغير الخارجي هو S₃

$$960/2 = 480$$

$$5000/8 = 625$$

$$2400/6 = 400$$

العامل المشترك هو 6

	X ₁	X ₂	X ₃	S ₁	S ₂	S ₃	R.H.S
S ₁	2	0	0	1	0	-1/3	160
S ₂	1	0	0	0	1	-1.33	1800
X ₂	1/2	1	1/2	0	0	1/6	400
MAX Z	-1	0	-1	0	0	2/3	1600

$$\text{الجديدة [S}_1\text{]} = [3 \ 2 \ 1 \ 1 \ 0 \ 0 \ 960] + (-2) [1/2 \ 1 \ 1/2 \ 0 \ 0 \ 1/6 \ 400] = [2 \ 0 \ 0 \ 1 \ 0 \ -1/3 \ 160]$$

$$\text{الجديدة [S}_2\text{]} = [5 \ 8 \ 4 \ 0 \ 1 \ 5000] + (-8) [1/2 \ 1 \ 1/2 \ 0 \ 0 \ 1/6 \ 400] = [1 \ 0 \ 0 \ 0 \ 1 \ -1.33 \ 1800]$$

$$\text{الجديدة [Z]} = [-3 \ -4 \ -3 \ 0 \ 0 \ 0 \ 0] + (4) [1/2 \ 1 \ 1/2 \ 0 \ 0 \ 1/6 \ 400] = [-1 \ 0 \ -1 \ 0 \ 0 \ 2/3 \ 1600]$$

المتغير الداخلي هو X₁

المتغير الخارجي هو S₁

$$160/2 = 80, 1800/1 = 1800, 400/0.5 = 800$$

العامل المشترك هو 2

	X ₁	X ₂	X ₃	S ₁	S ₂	S ₃	R.H.S
X ₁	1	0	0	1/2	0	-2/3	80
S ₂	0	0	0	-1/2	1	-0.67	1720
X ₂	0	1	1/2	-0.25	0	0.5	360
MAX Z	0	0	-1	1/2	0	0	1680

$$\text{الجديدة [S}_2\text{]} = [1 \ 0 \ 0 \ 0 \ 1 \ -1.33 \ 1800] + (-1) [1 \ 0 \ 0 \ 1/2 \ 0 \ -2/3 \ 80] = [0 \ 0 \ 0 \ -1/2 \ 1 \ -0.67 \ 1720]$$

$$\text{الجديدة [X}_2\text{]} = [1/2 \ 1 \ 1/2 \ 0 \ 0 \ 1/6 \ 400] + (-0.5) [1 \ 0 \ 0 \ 1/2 \ 0 \ -2/3 \ 80] = [0 \ 1 \ 1/2 \ -0.25 \ 0 \ 0.5 \ 360]$$

$$\text{الجديدة [Z] = [-1 0 -1 0 0 2/3 1600] + (1) [1 0 0 1/2 0 -2/3 80] = [0 0 -1 1/2 0 0 1680]}$$

المتغير الداخلي هو X_3

المتغير الخارجي هو X_2

$$360/0.5 = 720 , \text{ يهمل السالب والصفر}$$

العامل المشترك هو $1/2$

	X_1	X_2	X_3	S_1	S_2	S_3	R.H.S
X_1	1	0	0	1/2	0	-2/3	80
S_2	0	0	0	-1/2	1	-0.67	1720
X_3	0	2	2	-0.5	0	1	720
MAX Z	0	2	1	0	0	1	2400

$$\text{الجديدة [X}_1\text{] = [1 0 0 1/2 0 -2/3 80] + (0) [0 2 2 -0.5 0 1 720] = [1 0 0 1/2 0 -2/3 80]}$$

$$\text{الجديدة [S}_2\text{] = [0 0 0 -1/2 1 -0.67 1720] + (0) [0 2 2 -0.5 0 1 720] = [0 0 0 -1/2 1 -0.67 1720]}$$

$$\text{الجديدة [Z] = [0 0 -1 1/2 0 0 1680] + (1) [0 2 2 -0.5 0 1 720] = [0 2 1 0 0 1 2400]}$$

$$\therefore \text{MAX Z} = 2400 \text{ At } X_1 = 80 , X_2 = 0 , X_3 = 720$$