Simplex Two-phase Method

$$\text{Min } Z = 80X_1 + 60X_2$$

$$\text{s.t.} \begin{cases} 0.2X_1 + 0.32X_2 \le 0.25 \\ X_1 + X_2 = 1 \end{cases}$$

Solution

① Simple

$$Z = 80X_1 + 60X_2 + 0 \cdot X_3 + M\bar{X}_4$$

$$\text{s.t.} \begin{cases} 0.2X_1 + 0.32X_2 + X_3 = 0.25 \\ X_1 + X_2 + \bar{X}_4 = 1 \end{cases}$$

② Martix

$$A = \begin{bmatrix} 0.2 & 0.32 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} 0.25 \\ 1 \end{bmatrix}$$

$$X = [X_1 \quad X_2 \quad X_3 \quad \bar{X}_4]^T \qquad X_0 = [X_3 \quad \bar{X}_4]^T$$

$$C = [80 \quad 60 \quad 0 \quad M]^T \qquad C_0 = [0 \quad M]^T$$

$$C^T - C_0^T A = [80\ 60\ 0\ M] - [0\ M] \begin{bmatrix} 0.2 & 0.32 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}$$

$$= [80\ 60\ 0\ M] - [M\ M\ 0\ M]$$

$$= [80-M\quad 60-M\quad 0\quad 0]$$

$$C_0^T B = [0\quad M] \begin{bmatrix} 0.25 \\ 1 \end{bmatrix} = M$$

③ X^T

X_0 A B

$C^T - C_0^T A$ $-C_0^T B$

④ Iteration 1

	X_1	X_2	X_3	X_4		Ratio
X_3	0.2	0.32	1	0	0.25	$0.25/0.2 = 1.25$
$X_4 \to X_1$	1	1	0	1	1	$1/1 = 1$ min
	80	60	0	0	0	
	−1	−1	0	0	−1	

$-0.2R_2 + R_1$

$-80R_2 + R_3$

$R_2 + R_4$

↑ work column

⑤

	X_1	X_2	X_3	X_4	
X_3	0.2	0.32	1	0	0.25
X_1	1	1	0	1	1
	80	60	0	0	0
	-1	-1	0	0	-1

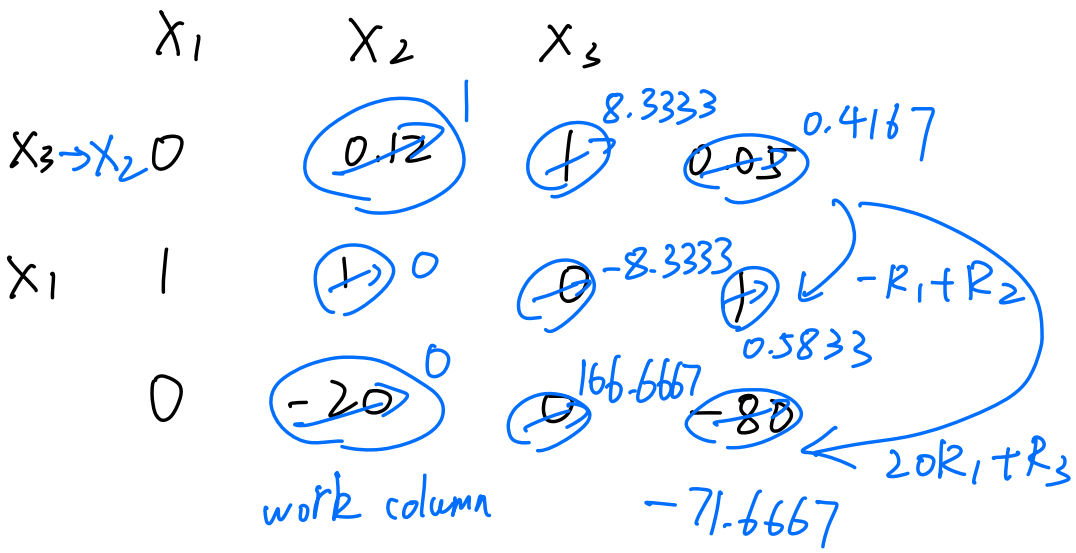
0.05
-0.2
0
0.12
-20
-80
-80
0
0

最后一行≥0
且人工变量非基
则消去最后一行

⑥ Iteration 2

	X_1	X_2	X_3		Ratio
X_3	0	0.12	1	0.05	$R_1 \times \frac{1}{0.12}$ 0.05/0.12 = 0.4167 min
X_1	1	1	0	1	1/1 = 1
	0	-20	0	-80	

min
↓
work column



So optimal solution is

$X_1^* = 0.5833 \quad X_2^* = 0.4167 \quad X_3^* = X_4^* = 0$

with $z^* = 71.6667$ (minimization)