Assignment 2

Name: HUANG JIAHUI
Student Number: 44251017

Transform to Standard Form:

Objective: total profit: $\max z = 2x_1 + 3x_2$

subject to: Stock Levels: $0.5x_1 + 0.3x_2 \le 1000$

$0.2x_1 + 0.25x_2 \le 500$

$0.25x_1 + 0.5x_2 \le 800$

non-negative: $x_1, x_2 \ge 0$

$\Rightarrow$

maximize $z = 2x_1 + 3x_2$

subject to $0.5x_1 + 0.3x_2 + s_1 = 1000$

$0.2x_1 + 0.25x_2 + s_2 = 500$

$0.25x_1 + 0.5x_2 + s_3 = 800$

$x_1, x_2, s_1, s_2, s_3 \ge 0$

Simplex Table

Cj	Basic Variable	2 x_1	3 x_2	0 s_1	0 s_2	0 s_3	0 bi	bi/aij
0	s_1	0.5	0.3	1	0	0	1000	1000/0.3 ≈ 3333.3
0	s_2	0.2	0.25	0	1	0	500	2000
0	s_3	0.25	0.5	0	0	1	800	1600
	zj	0	0					
	Cj - zj	2	3					

pivot value: 0.5 (max: 3)

min: 1600

select s_1, s_2, s_3 as basic variables

Solution:

$(z, x_1, x_2, s_1, s_2, s_3) = (0, 0, 0, 1000, 500, 800)$

$\Rightarrow$

$(x_1, x_2) = (0, 0)$, $z = 0$

1° Devide all variables of the row by the pivot value (0.5)

Cj	Basic Variable	2 x_1	3 x_2	0 s_1	0 s_2	0 s_3	0 bi	bi/aij
0	s_1	0.48	0	1	0	-0.6	520	1083.33
0	s_2	0.2	0	0	1	-0.5	100	500
3	x_2	0.08	1	0	0	2	1600	20000
	zj	0.72				6		
	Cj - zj	1.28				-6		

-0.3x, -0.25x

-6: less than 0

2° Set 0 to cells of the other rows of the pivot column

(for s_2 row, first all values of the pivot row times 0.25, the subtract these values from the values of s_2 row)

3° repeat Step 1~2

Cj	Basic Variable	2 x_1	3 x_2	0 s_1	0 s_2	0 s_3	0 bi	bi/aij
0	s_1	0	0	1	-2.4	0.6	280	
2	x_1	1	0	0	5	-2.5	500	
3	x_2	0	1	0	-2.4	3.2	1360	
	zj	2	3	0	2.8	4.6	5080	
	Cj - zj			0	-2.8	-4.6		

-0.48x, -0.08x

-2.8, -4.6: less than 0

Thus, the optimal solution $(z, x_1, x_2, s_1, s_2, s_3) = (5080, 500, 1360, 280, 0, 0)$

the optimal value $z = 5080$