

# Numerical Example

$$\begin{aligned} \min z &= 3x_1 + x_2 + 4x_3 \\ \text{st } 6x_1 + 3x_2 + 5x_3 &\leq 25 \\ 3x_1 + 4x_2 + 5x_3 &\leq 20 \end{aligned}$$

Solve, then we'll perform sensitivity analysis on the solution. Then the initial tableau is:

$x_1$	$x_2$	$x_3$	$s_1$	$s_2$	rhs
-3	-1	-4	0	0	0
6	3	5	1	0	25
3	4	5	0	1	20

The optimal tableau:

$x_1$	$x_2$	$x_3$	$s_1$	$s_2$	rhs
0	2	0	1/5	3/5	17
1	-1/3	0	1/3	-1/3	5/3
0	1	1	-1/5	2/5	3

Now label what we have (from the items listed at the beginning):

$$A = \begin{bmatrix} 6 & 3 & 5 & 1 & 0 \\ 3 & 4 & 5 & 0 & 1 \end{bmatrix} \quad \mathcal{B} = \{x_1, x_3\} \quad B = \begin{bmatrix} 6 & 5 \\ 3 & 5 \end{bmatrix}$$

$$B^{-1} = \begin{bmatrix} 1/3 & -1/3 \\ -1/5 & 2/5 \end{bmatrix} \quad \mathbf{c}^T = [3, 1, 4, 0, 0] \quad \mathbf{c}_B^T = [3, 4]$$

1)	17.00000	
VARIABLE	VALUE	REDUCED COST
X1	1.666667	0.000000
X2	0.000000	2.000000
X3	3.000000	0.000000
S1	0.000000	0.200000
S2	0.000000	0.600000
ROW	SLACK OR SURPLUS	DUAL PRICES
2)	0.000000	0.200000
3)	0.000000	0.600000

RANGES IN WHICH THE BASIS IS UNCHANGED:

VARIABLE	OBJ COEFFICIENT RANGES		
	CURRENT COEF	ALLOWABLE INCREASE	ALLOWABLE DECREASE
X1	3.000000	1.800000	0.600000
X2	1.000000	2.000000	INFINITY
X3	4.000000	1.000000	1.500000
S1	0.000000	0.200000	INFINITY
S2	0.000000	0.600000	INFINITY
ROW	RIGHTHAND SIDE RANGES		
	CURRENT RHS	ALLOWABLE INCREASE	ALLOWABLE DECREASE
2	25.000000	15.000000	5.000000
3	20.000000	5.000000	7.500000