IEOR 162
Spring 2022

An additional example

max z = 3x1 + 5x2

subject to: x1 ≤ 4

2x2 ≤ 12

3x1 + 2x2 ≤ 18

x1 ≥ 0, x2 ≥ 0

Iteration	Basic Variable	Eq #	z	x1	x2	x3	x4	x5	RHS
0	z	0	1	-3	-5	0	0	0	0
	x3	1	0	1	0	1	0	0	4
	x4	2	0	0	2	0	1	0	12
	x5	3	0	3	2	0	0	1	18

2	z	0	1	0	0	0	3/2	1	36
	x3	1	0	0	0	1	1/3	-1/3	2
	x2	2	0	0	1	0	1/2	0	6
	x1	3	0	1	0	0	-1/3	1/3	2

1. By how much can the coefficient of x1 in the objective function change while keeping the same optimal solution?

Coefficient	Range in which (x1, x2) = (2, 6) remains optimal
$c1 = 3$	$0 \leq c1 \leq 7.5$

2. By how much can the coefficient of x2 in the objective function change while keeping the same optimal solution?

Coefficient	Range in which (x1, x2) = (2, 6) remains optimal
$C2 = 5$	$2 \leq c2$

3. What is the shadow price of each constraint and the range?

Note that each sensitivity analysis assumes that all other bi and all cj and aij do not change.

Right-hand-side	Range in which x3, x2 and x1 remain the optimal basic variables
$b1 = 4$	$2 \leq b1$ (shadow price = 0)→{non-binding constraint}
$b2 = 12$	$6 \leq b2 \leq 18$ (shadow price = 3/2)
$b3 = 18$	$12 \leq b3 \leq 24$ (shadow price = 1)