Atividade 3

Bruno Alexandre Ferreira Pinto Texeira
2019100036

Min $z = 16x_1 + 14x_2$

s.a

$10x_1 + 4x_2 \geq 120$

$3x_1 + 4x_2 \geq 60$

$1x_1 + 1x_2 \leq 20$

$x_1 \geq 0, x_2 \geq 0$

a) Max $z' = -16x_1 - 14x_2$

s.a

$10x_1 + 4x_2 \geq 120 \overset{x-1}{\Leftrightarrow} -10x_1 - 4x_2 \leq -120$

$3x_1 + 4x_2 \geq 60 \overset{x-1}{\Leftrightarrow} -3x_1 - 4x_2 \leq -60$

$1x_1 + 1x_2 \leq 20 \quad\quad 1x_1 + 1x_2 \leq 20$

$x_1 \geq 0, x_2 \geq 0$

→ $-10x_1 - 4x_2 + x_3 = -120$

$-3x_1 - 4x_2 + x_4 = -60$

$1x_1 + 1x_2 + x_5 = 20$

abtas

		-16	-14	0	0	0		
		x_1	x_2	x_3	x_4	x_5	b	
x_3	0	-10	-4	1	0	0	-120	(1)
x_4	0	-3	-4	0	1	0	-60	(2)
x_5	0	1	1	0	0	1	20	(3)
$z_j - c_j$		16	14	0	0	0	0	

↑

C.A

$\frac{16}{|-10|} = \frac{8}{5}$ / $\frac{14}{|-4|} = \frac{7}{2}$

SBNA: $(0, 0, -120, -60, 20)$

z': 0

		-16	-14	0	0	0		
		x_1	x_2	x_3	x_4	x_5	b	
x_1	-16	1	2/5	-1/10	0	0	12	$(1)' = -1/10\,(1)$
x_4	0	0	-14/5	-3/10	1	0	-24	$(2)' = (2) + 3(1)'$
x_5	0	0	3/5	1/10	0	1	8	$(3)' = (3) - (1)'$
$z_j - c_j$		0	38/5	8/5	0	0	-192	

↑

C.A

$\frac{38/5}{|-14/5|} = \frac{19}{7}$ / $\frac{8/5}{|-3/10|} = \frac{16}{3}$

SBNA: $(12, 0, 0, -24, 8)$

z': -192

		-16	-14	0	0	0		
		x_1	x_2	x_3	x_4	x_5	b	
x_1	-16	1	0	-1/7	1/7	0	60/7	$(1)'' = (1)' - 2/5(2)''$
x_2	-14	0	1	3/28	-5/14	0	60/7	$(2)'' = -5/14(2)'$
x_5	0	0	0	1/28	3/14	1	20/7	$(3)'' = (3)' - 3/5(2)''$
$z_j - c_j$		0	0	11/14	19/7	0	-1800/7	

SBA $x^*(60/7, 60/7, 0, 0, 20/7)$

$z'^* = -\frac{1800}{7} \Rightarrow z^* = \frac{1800}{7}$

Quadro ótimo porque não há valores negativos na ~~coluna~~ coluna do b

b)

Primal

$$\min Z = 16x_1 + 14x_2$$

s.a

$10x_1 + 4x_2 \geq 120 \rightarrow U_1$

$3x_1 + 4x_2 \geq 60 \rightarrow U_2$

$1x_1 + 1x_2 \leq 20 \rightarrow U_3$

$x_1 \geq 0, \; x_2 \geq 0$

Dual

$$\max Z_d = 120U_1 + 60U_2 + 20U_3$$

s.a

$10U_1 + 3U_2 + 1U_3 \leq 16$

$4U_1 + 4U_2 + 1U_3 \leq 14$

$U_1 \geq 0, \; U_2 \geq 0 \quad U_3 \leq 0$

c)

		-16	-14	0	0	0	
		x_1	x_2	x_3	x_4	x_5	b
x_1	-16	1	0	-1/7	1/7	0	60/7
x_2	-14	0	1	3/28	-5/14	0	60/7
x_5	0	0	0	1/28	3/14	1	20/7
$z_j - c_j$		0	0	11/14	19/7	0	-1800/7

$$U^* = (11/14, 19/7, 0, 0, 0)$$

$$Z_d^* = Z^* = \frac{1800}{7}$$