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### Atividade 3

Min  $Z = 16x_1 + 14x_2$   
 Sa

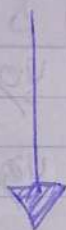
$$10x_1 + 4x_2 \geq 120$$

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

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

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

a)



Max  $Z' = -16x_1 - 14x_2$   
 Sa

$$-10x_1 - 4x_2 \leq -120$$

$$-3x_1 - 4x_2 \leq -60$$

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

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

$$-10x_1 - 4x_2 + x_3 = -120$$

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

$$1x_1 + 1x_2 + x_5 = 20$$

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

	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	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	

SBNA:  $x = (0, 0, -120, -60, 20) \rightarrow Z' = 0$

	-16 $x_1$	-14 $x_2$	0 $x_3$	0 $x_4$	0 $x_5$	b
$x_2$ -14	$\frac{5}{2}$	1	$-\frac{1}{4}$	0	0	30
$x_4$ 0	7	0	-1	1	0	60
$x_5$ 0	$-3\frac{1}{2}$	0	$\frac{1}{4}$	0	1	-10
$Z_j - C_j$	-19	0	$\frac{7}{2}$	0	0	-420

$$(1)' = (1) \times (-\frac{1}{4})$$

$$(2)' = (2) - (-4) \times (1)'$$

$$(3)' = (3) - 1 \times (1)'$$

SBA:  $x = (0, 30, 0, 60, -10) \rightarrow Z' = -420$

	-16 $x_1$	-14 $x_2$	0 $x_3$	0 $x_4$	0 $x_5$	b
$x_2$ -14	0	1	$\frac{1}{6}$	0	$\frac{5}{3}$	55
$x_4$ 0	0	0	$\frac{1}{6}$	1	$\frac{14}{3}$	130
$x_1$ -16	1	0	$-\frac{1}{6}$	0	$-\frac{2}{3}$	$\frac{20}{3}$
$Z_j - C_j$	0	0	$\frac{1}{3}$	0	$-\frac{38}{3}$	-876,6

$$(1)'' = (1)' - (\frac{5}{2}) \times (3)''$$

$$(2)'' = (2)' - 7 \times (3)''$$

$$(3)'' = (3)' \times (-\frac{2}{3})$$

R: Quadro ótimo porque não existem valores negativos na coluna b

SBA:  $x^* = (\frac{20}{3}, 55, 0, 130, 0) \rightarrow Z'^* = -876,6$

$$Z^* = 876,6$$



b)

PRIMAL

$$\text{Min } Z = 16n_1 + 14n_2$$

s.a

$$10n_1 + 4n_2 \geq 120 \quad \leftarrow V_1$$

$$3n_1 + 4n_2 \geq 60 \quad \leftarrow V_2$$

$$1n_1 + 1n_2 \leq 20 \quad \leftarrow V_3$$

$$n_1 \geq 0, n_2 \geq 0$$

DUAL

$$\text{Max } Z_d = 120U_1 + 3U_2 + 3U_3$$

s.a

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

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

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

c) → Solução ótima e Z ótimo

	-16 $n_1$	-14 $n_2$	1	0 $n_3$	0 $n_4$	0 $n_5$	b
$n_2 - 14$	0	1		$\frac{1}{6}$	0	$\frac{5}{3}$	55
$n_4 - 0$	0	0		$\frac{1}{6}$	1	$\frac{14}{3}$	130
$n_1 - 16$	1	0		$-\frac{1}{6}$	0	$-\frac{2}{3}$	$\frac{20}{3}$
$Z - G$	0	0		$\frac{1}{3}$	0	$-\frac{38}{3}$	-876,6
	$U_4^*$	$U_5^*$		$U_1^*$	$U_2^*$	$-U_3^*$	

Solução ótima do Dual:

$$U^* = \left( \frac{1}{3}, 0, \frac{38}{3}, 0, 0 \right)$$

$$\text{Com } Z_d^* = Z^* = -876,6$$

$$\begin{aligned} \text{Verificação} = Z_d^* &= 120U_1^* + 3U_2^* + 3U_3^* = \\ &= 120 \times \frac{1}{3} + 3 \times 0 + 3 \times \left( -\frac{38}{3} \right) = Z \end{aligned}$$

≠ Não ~~consegui~~ conseguir ver o erro