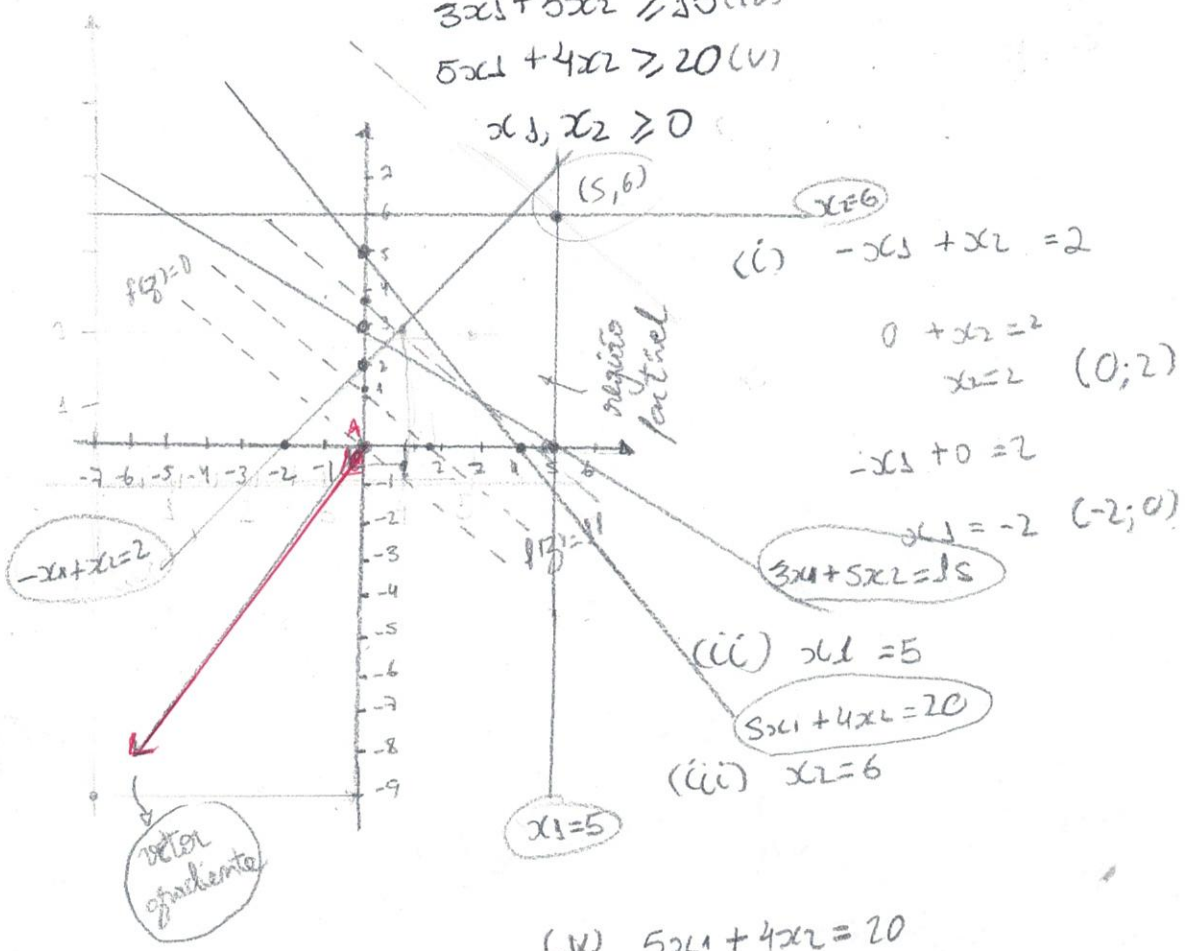
Exercício fh-po-exerc-44

$$\text{Mín } Z = -7x_1 + 9x_2$$

(menos)

s.a:

$$-x_1 + x_2 \leq 2 \quad (i)$$
$$x_1 \leq 5 \quad (ii)$$
$$x_2 \leq 6 \quad (iii)$$
$$3x_1 + 5x_2 \geq 15 \quad (iv)$$
$$5x_1 + 4x_2 \geq 20 \quad (v)$$
$$x_1, x_2 \geq 0$$



(i) $-x_1 + x_2 = 2$

$0 + x_2 = 2$

$x_2 = 2$ (0;2)

$-x_1 + 0 = 2$

$x_1 = -2$ (-2;0)

(ii) $x_1 = 5$

(iii) $x_2 = 6$

(iv) $3x_1 + 5x_2 = 15$

$3.0 + 5x_2 = 15$ (0;3)

$5x_2 = 15$

$x_2 = 3$

$3x_1 + 5x_2 = 15$

$3x_1 + 5.0 = 15$ (5;0)

$x_1 = 15/3$

$x_1 = 5$

(v) $5x_1 + 4x_2 = 20$

$5.0 + 4x_2 = 20$ (0;5)

$4x_2 = 20$

$x_2 = 20/4$

$x_2 = 5$

$5x_1 + 4x_2 = 20$

$5x_1 + 4.0 = 20$ (4;0)

$5x_1 = 20$

$x_1 = 20/5$

$x_1 = 4$

$f(x_1,x_2) = -7x_1 - 9x_2 = z$

$-7.0 - 9.0 = z \therefore z = 0$

$(0;0);\ z=0$

$-7(1) - 9x_2 = 0 \therefore$

$(1; -\frac{7}{9});\ z=0$

$-7 - 9x_2 = 0$

$-9x_2 = 7$

$\therefore x_2 = -\frac{7}{9}$

$x_2 \simeq -0,78$

$\nabla f = [1 \quad 2]^T$

$f(1,2) = -7(1) - 9(2) = -25$

$-7x_1 - 9.0 = -25$

$-7x_1 = -25$

$x_1 = \frac{-25}{-7}$

$x_1 \simeq 1,57$

$-7x_1 - 9x_2 = -25$

$(0; 1,22);\ z = -25$

$-7.0 - 9x_2 = -25$

$(1,57; 0); z = -25$

$-9x_2 = -25$

$x_2 = \frac{-25}{-9}$

$x_2 \simeq 1,22$

$$C \begin{cases} 3x_1 + 5x_2 = 15 & (iv) \\ 5x_1 + 4x_2 = 20 & (v) \end{cases}$$

$C \simeq (1,25; 2,916)$

$f(C) = -7(1,25) - 9(2,916)$

método da comparação

$f(C) = -8,75 - 26,244$

$f(C) \simeq -34,994$

$x_1 = \frac{15 - 5x_2}{3}$ (iv)

$x_1 = \frac{20 - 4x_2}{5}$ (v)

Substituindo o valor de x_2

$\frac{15 - 5x_2}{3} = \frac{20 - 4x_2}{5}$

$3x_1 + 5.1,25 = 15$

$\frac{75 - 25x_2}{15} = \frac{60 - 12x_2}{15}$

$3x_1 + 6,25 = 15$

$3x_1 = 15 - 6,25$

$5 - 16x_2 = 4 - 0,8x_2$

$3x_1 = 8,75$

$1 = -0,8x_2 + 1,6x_2$

$x_1 = \frac{8,75}{3}$

$1 = 0,8x_2$

$x_1 \simeq 2,916$

$x_2 = \frac{1}{0,8} \therefore x_2 = 1,25$

$f(x_1, x_2) = -7x_1 - 9x_2 = 8$ $(0; 3{,}89)$

$0 - 9x_2 = -34{,}994$

$x_2 = \frac{-34{,}994}{-9}$

$x_2 \approx 3{,}89$

$-7x_1 - 0 = 8$ $(5; 0)$

$-7x_1 = -34{,}994$

$x_1 = \frac{-34{,}994}{-7}$

$x_1 \approx 5$

Como queremos minimizar, pegue o valor ótimo e a solução ótima.

$f(5,6) \quad -7 \cdot 5 \quad -9 \cdot 6 = -89$

Valor ótimo $= -89$

solução ótima $= f(5,6)$