1) Determinar el menor y mayor valor de la función

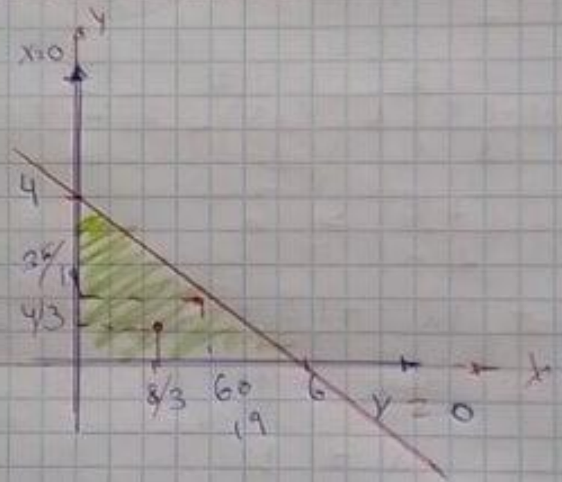
$z = x^2 - xy + y^2 - 4x$

en el dominio cerrado cuyo borde son

las rectas $x=0$, $y=0$, $2x+3y-12=0$

Dom: $\{(x,y) \in \mathbb{R}^2 / 2x+3y-12=0\}$

Grafica del dominio



P.C

$$\frac{\delta z}{\delta x} = 2x - y - 4 = 0$$

$$2x - y = 4 \qquad (i)$$

$$\frac{\delta z}{\delta y} = -x + 2y = 0$$

$$2y - x = 0 \qquad (ii) \times 2$$

$$\cancel{2x} - y = 4$$

$$4y - \cancel{2x} = 0$$

$$3y = 4$$

$$y = 4/3$$

$$x = 8/3$$

$$(8/3 , 4/3) \text{ P.C}$$

Ecuación de Lagrange

$$L(x, y, \lambda) = x^2 - xy + y^2 - 4x + \lambda(2x + 3y - 12)$$

P C:

$$\frac{\delta L}{\delta x} = 2x - y - 4 + 2\lambda = 0 \qquad (i)$$

$$\frac{\delta L}{\delta y} = -x + 2y + 3\lambda = 0 \qquad (ii)$$

$$\frac{\delta L}{\delta \lambda} = 2x + 3y - 12 = 0 \qquad (iii)$$

$$i \times -3/2) \qquad -3x + \frac{3}{2}y + 6 - \cancel{3\lambda} = 0$$

$$(ii) \qquad -x + 2y + \cancel{3\lambda} = 0$$

$$-4x + \frac{7}{2}y + 6 = 0$$

$$(iii) \qquad 2x + 3y - 12 = 0 \qquad \times 2$$

$$-\cancel{4x} + \frac{7y}{2} + 6 = 0$$

$$\cancel{4x} + 6y - 24 = 0$$

$$\frac{19y}{2} = 18$$

$$\Rightarrow y = \frac{36}{19}$$

$$\Rightarrow x = \frac{60}{19}$$

$$P.C\left(\frac{60}{19}, \frac{36}{19}\right)$$

$$f\left(\frac{8}{3}, \frac{4}{3}\right) = -\frac{48}{9} \quad (\text{Minimo})$$

$$f\left(\frac{60}{19}, \frac{36}{19}\right) = \frac{2280}{19} \quad (\text{Maximo})$$