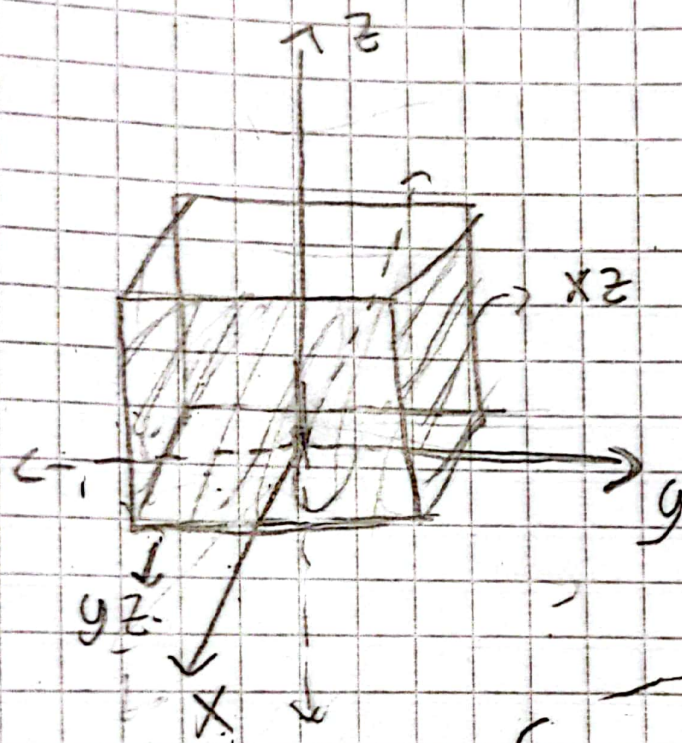


a



b

Area de las caras laterales

$$A_1 = xz + xz$$

Area de la cara frontal y trasera

$$A_2 = yz + yz$$

Area de la cara inferior, sin tapa

$$A_3 = xy$$

$$A_{\text{sup}} = xy + 2xz + 2yz$$

$$A_{\text{sup}} = 12$$

$$xy + 2xz + 2yz = 12$$

e

$$f(x, y, z) = xyz$$

$$g(x, y, z) = xy + 2yz + 2xz = 12$$

$$\nabla f = \lambda \nabla g$$

$$\nabla f = \langle yz, xz, xy \rangle$$

$$\nabla g = \langle y + 2z, x + 2z, 2y + 2x \rangle$$

$$\textcircled{1} yz = \lambda y + 2\lambda z$$

$$\textcircled{2} xz = \lambda x + 2\lambda z$$

$$\textcircled{3} xy = 2\lambda y + 2\lambda x$$

$$\textcircled{4} xy + 2yz + 2xz = 12$$

$$\textcircled{1} yz - \lambda y = 2\lambda z$$

$$y = \frac{2\lambda z}{z - \lambda}$$

$$\textcircled{3} x \left( \frac{2\lambda z}{z - \lambda} \right) = 2\lambda \left( \frac{2\lambda z}{z - \lambda} \right) + 2\lambda x$$

$$\frac{2\lambda x z}{z - \lambda} = \frac{4\lambda^2 z}{z - \lambda} + 2\lambda x$$

$$2\lambda x z = 4\lambda^2 z + 2\lambda x(z - \lambda)$$

$$2\lambda x z = 4\lambda^2 z + 2\lambda x z - 2\lambda^2 x$$

$$\cancel{2\lambda x z} - \cancel{2\lambda x z} + 2\lambda^2 x = 4\lambda^2 z$$

$$2\lambda^2 x = 4\lambda^2 z$$

$$x = 2z$$

②

$$(2z)(z) = \lambda(2z) + 2\lambda z$$

$$2z^2 = 2\lambda z + 2\lambda z$$

$$2z^2 = 4\lambda z$$

$$z = 2\lambda$$



$$x = 4\lambda$$

$$y = \frac{2\lambda(2\lambda)}{2\lambda - \lambda}$$

$$= \frac{4\lambda^2}{\lambda}$$

$$y = 4\lambda$$

$$\textcircled{4} \quad (4\lambda)(4\lambda) + 2(4\lambda)(2\lambda) + 2(4\lambda)(2\lambda) = 12$$

$$16\lambda^2 + 16\lambda^2 + 16\lambda^2 = 12$$

$$48\lambda^2 = 12$$

$$\lambda^2 = \frac{1}{4}$$

$$\lambda = \pm \frac{1}{2}$$

$$\lambda = \frac{1}{2}$$

$$x = 2 \quad y = 2 \quad z = 1$$

$$x = -2 \quad y = -2 \quad z = -1$$

$$\boxed{f(2, 2, 1) = 4} \rightarrow \text{MÁXIMO}$$

$$f(-2, -2, -1) = -4 \rightarrow \text{MÍNIMO}$$

$$\text{Volumen máximo} = 4$$