Aula 156 - 14.8/18

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- Lagrange com duas restrições

$$\nabla f(x,y,z) = \lambda \nabla g(x,y,z) = \mu \nabla h(x,y,z)$$

$$(0,0,1) = \lambda(2x, 2y, -2z) + \mu(1,1,1)$$

- $\lambda 2x + \mu = 0$

$\lambda 2y + \mu = 0$

$-\lambda 2z + u = 0$

- $g = x^2 + y^2 - z^2 = 0$

$h = x + y + z = 0$

- $\mu = -2\lambda x$

$\mu = -2\lambda y$

$\therefore -2\lambda x = -2\lambda y \quad \therefore x = y$

- $x + y + z = 24 \Rightarrow x + x + z = 24 \Rightarrow z = 24 - 2x$
- $x^2 + y^2 = z^2 \Rightarrow 2x^2 = z^2 \Rightarrow 2x = (24 - 2x)^2 \Rightarrow 2x^2 = 576 - 96x + 4x^2$

$\Rightarrow 2x^2 - 96x + 576 = 0$

$x = 24 \pm 12\sqrt{2}$

$y = 24 \pm 12\sqrt{2}$

$z = -24 \pm 24\sqrt{2}$

- $f(24 + 12\sqrt{2}, 24 + 12\sqrt{2}, -24 - 24\sqrt{2}) = -24 - 24\sqrt{2}$
- $f(24 - 12\sqrt{2}, 24 - 12\sqrt{2}, -24 + 24\sqrt{2}) = -24 + 24\sqrt{2}$

- Portanto o valor máximo é $-24 + 24\sqrt{2}$ e o mínimo $-24 - 24\sqrt{2}$