

álculo 1, stewart, vol 1, ed 5, cap 4.7.

3 $P = x \cdot y = 100$ condição $y = \frac{100}{x}$

$S = x + y$ otimização

$S = x + \frac{100}{x}$ equação da soma em função de x

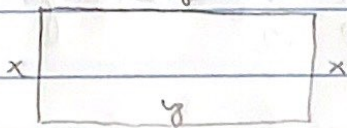
$S'(x) = 1 - 100x^{-2}$ como queremos achar o mínimo, $f'(x) = 0$

$1 - 100x^{-2} = 0$

$1 = \frac{100}{x^2} \rightarrow x^2 = 100 \rightarrow x = \pm 10$ valores máximos ou mínimos de $S(x)$

$x = +10 \quad y = +10$

5 $P = 2x + 2y = 100$



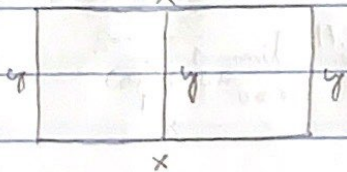
$x + y = 50$

$A = x \cdot y = x \cdot (50 - x) = 50x - x^2$

$A'(x) = 50 - 2x = 0$ em $x = 25$

$25 + y = 50 \rightarrow y = 25$

9 $A = x \cdot y = 1500000$



$y = \frac{1500000}{x} = 1,5 \cdot 10^6$

$C_{area} = 2x + 3y$ otimizar

$C_{area}(x) = 2x + 3(1,5 \cdot 10^6) = 2x + 4,5 \cdot 10^6$

$C_{area}'(x) = 2 + (-4,5 \cdot 10^6 \cdot x^{-2}) = 2 - \frac{4,5 \cdot 10^6}{x^2} = 0$

$2 = \frac{4,5 \cdot 10^6}{x^2} \rightarrow x^2 = \frac{4,5 \cdot 10^6}{2} \rightarrow x = \pm \sqrt{2250000}$

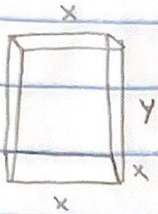
$x = \pm 1500$

$x = +1500$

$15000 \cdot y = 15000000$

$y = \frac{15000}{15} = 1000$

10



$$V = (x \cdot x) \cdot y = x^2 \cdot y = 32000 \text{ cm}^3 \quad y = \frac{32000}{x^2}$$

$$\text{Material} = (x \cdot x) + (x \cdot y) \cdot 4 = x^2 + 4xy$$

↳ buscar mínimo

$$= x^2 + 4 \cdot \frac{32000}{x^2} = x^2 + \frac{128000}{x^2}$$

$$\text{Material}'(x) = 2x + -128000 x^{-2}$$

$$= 2x - \frac{128000}{x^2} = 0$$

$$2x = \frac{128000}{x^2}$$

$$2x \cdot x^2 = 128000$$

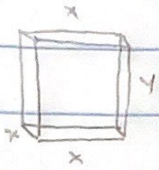
$$x^3 = 64000$$

$$y = \frac{32000}{1600} = (20) \text{ cm}^3$$

$$2x^3 = 128000$$

$$x = 40 \text{ cm}^3$$

11



$$\text{Material} = (x \cdot x) + x \cdot y \cdot 4 = x^2 + 4xy = 1200 \text{ cm}^2$$

$$V = x \cdot x \cdot y = x^2 \cdot y \quad \text{+ optimizar}$$

$$y = \frac{1200 - x^2}{4x}$$

$$V(x) = x^2 \cdot \frac{(1200 - x^2)}{4x} = \frac{x \cdot (1200 - x^2)}{4}$$

$$= \frac{1200x - x^3}{4}$$

$$V'(x) = \frac{1}{4} \cdot (1200 - 3x^2) = 300 - \frac{3}{4}x^2 = 0$$

$$300 = \frac{3}{4}x^2$$

$$\frac{1200}{3} = x^2$$

$$x^2 = 400$$

$$x = \pm 20$$

$$x = +20$$

$$y = \frac{1200 - 400}{80} = 10$$

$$V = 400 \cdot 10 = 4000 \text{ cm}^3$$