fuerza:

$$f = \frac{kw}{\cos\theta + k\sin\theta}$$

$k =$ [illegible]

$w = 10N$

$\theta =$ angulo

$$\frac{d}{d\theta}(\cos\theta + k\sin\theta) = -\sin(\theta) + k\cos(\theta) = 0$$

$$-\sin\theta + k\cos\theta = 0$$

$$\sin\theta = k\cos\theta$$

$$\tan\theta = k$$

$$\theta = \arctan k \quad \theta = \arctan(0.1)$$

$$\theta = 0.0997 rad$$

-> fuerza

$$f = \frac{kw}{\cos\theta + k\sin\theta} \qquad f = \frac{0.1 \cdot 10}{\cos(0.0997) + 0.1\sin(0.0997)}$$

$$f = 0.995 N$$

2 Iluminación

$$I(h) = k\frac{h}{(h^2+4)^{3/2}}$$

$$I' = k\,\frac{(h^2+4)^{3/2}\cdot 1 - h\cdot\frac{3}{2}(h^2+4)^{1/2}\cdot 2h}{(h^2+4)^3}$$

$$= k\cdot\frac{(h^2+4)^{1/2}\left[(h^2+4)-3h^2\right]}{(h^2+4)^3}$$

$$= k\,\frac{(h^2+4)^{1/2}(4-2h^2)}{(h^2+4)^3}$$

$$(4-2h^2)=0$$

$$h^2=2$$

$$h=\sqrt{2}$$

→ Segunda derivada $\quad I'' = k\,\frac{(h^2+4)^{1/2}(-4h)-3(4-2h^2)h(h^2+4)^{-1/2}}{(h^2+4)^3}$

con $h=\sqrt{2}$ da negativo

$\therefore h=\sqrt{2}$

Actividad Viga

$$\text{Max } S = kwh^2$$

$$h^2 = 24^2 - w^2$$

$$\text{Max } S(w) = \max_w kw\,(24^2 - w^2)$$

$$\frac{dS}{dw} = k\left[(24^2 - w^2)\frac{d}{dw}(w) + w\frac{d}{dw}(24^2 - w^2)\right]$$

$$\frac{dS}{dw} = k\left[(24^2 - w^2) + w(-2w)\right]$$

$$= k\,(576 - 3w^2)$$

-> igualamos a 0 $\quad 576 - 3w^2 = 0$

$$w = \sqrt{192} = 8\sqrt{3} \approx 13.84$$

-> Segunda derivada

$$\frac{d^2S}{dw^2} = -6kw \rightarrow -6k(8\sqrt{3})$$

Como da negativo

Se confirma que $w \approx 13.84$

Para $0 \leq x \leq \frac{13}{2}$, $\max V(x) = \max (13-2x)^2 \cdot x$

$$\left(169 - 2(13 \cdot 2)x + 4x^2\right) \cdot x$$

$$(169 - 52x + 4x^2) \cdot x$$

$$f(x) = 169x - 52x^2 + 4x^3$$

$$f'(x) = 169 - 104x + 12x^2$$

$$x_1 = \frac{13}{2} \qquad x_2 = \frac{13}{6}$$

$$x = \frac{13}{6}$$

$$5625 - 750x + 25x^2 = 1296 + 16x^2 - 480x + 2400$$

$$25x^2 - 16x^2 - 750x + 480x + 5625 - 2400 - 1296 = 0$$

$$9x^2 - 270x + 1930 = 0$$

$$x = \frac{270 \pm \sqrt{3540}}{18}$$

$$x = \frac{270 \pm 59.5}{18}$$

$x_1 = 18.3$

$x_2 = 11.7$

$0 \leq x \leq 15 \rightarrow x = 11.7$

$$t = \frac{\sqrt{9^2 + (15-x)^2}}{4} + \frac{x}{5}$$

$$f(x) = \sqrt{81 + (15-x)^2}$$

$$\frac{d}{dx}\sqrt{g(x)} = \frac{g'(x)}{2\sqrt{g(x)}}$$

$$g(x) = 81 + (15-x)^2$$

$$g'(x) = -2(15-x)$$

$$f'(x) = \frac{-2(15-x)}{2\sqrt{81+(15-x)^2}} = \frac{-(15-x)}{\sqrt{81+(15-x)^2}}$$

$$f'(x) \to \frac{-(15-x)}{4\sqrt{81+(15-x)^2}} + \frac{1}{5}$$

-> ahora igualar a 0

$$\frac{-(15-x)}{4\sqrt{81+(15-x)^2}} + \frac{1}{5} = 0$$

$$\frac{15-x}{4\sqrt{81+(15-x^2)}} = \frac{1}{5} \quad \to \quad 5(15-x) = 4\sqrt{81+(15-x)^2}$$

$$25(15-x)^2 = 16(81 + (15-x)^2)$$