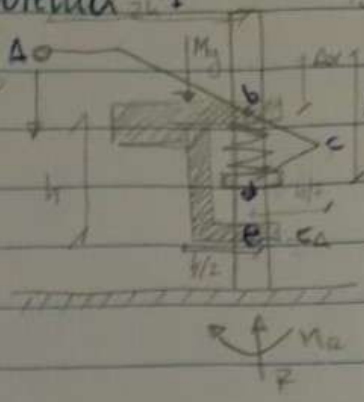
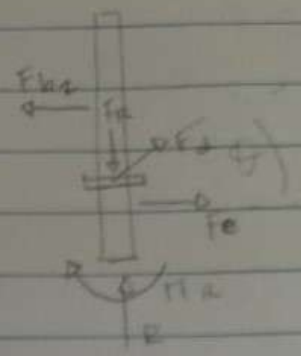
Problema 1 $\Delta x = 4m$ // $P = 30N$ // $h = 12cm$ // $M = 1,2kg$

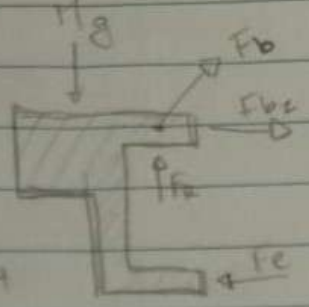
Cuanto tiene que valer k?



$\Sigma F \rightarrow \boxed{R = M_d + P}$ (1')

$\Sigma \Pi_b \rightarrow \boxed{\Pi_R = h\left(\frac{\Pi_g}{2} + 2P\right)}$ (2)





$\Sigma \Pi_b = 0 \rightarrow \Pi_g \cdot \frac{h}{2} = F_c \cdot \Delta x$

$\boxed{F_c = \frac{\Pi_g \, h}{2\Delta x}}$ (3)

$\Sigma \Pi_d = 0 \rightarrow F_{bz}(h - \Delta x) = M_R$

$\boxed{F_{bz} = \frac{\Pi_R}{(h - \Delta x)}}$ (4)

$\Sigma F_H = 0 \rightarrow F_{bz} - F_c = F_d \cdot \cos(\theta)$

$\cos(\theta) = \frac{Ca}{h} = \frac{\sqrt{(h/2)^2 - \left(\frac{h-\Delta x}{2}\right)^2}}{h/2} = \frac{\sqrt{h^2 - Co^2}}{h}$

$\boxed{F_d = \frac{(F_{bz} - F_c) \cdot h}{\sqrt{h^2 - Co^2}}}$ (5)

$\Sigma F_V = 0 \rightarrow F_R = R + F_d \operatorname{sen}\theta$

$\operatorname{sen}\theta = \frac{Co}{2h/2} = \frac{Co}{h}$

$\boxed{F_R = R + F_d \cdot Co/h}$ (6)

1) $\rightarrow R = 41,76N$

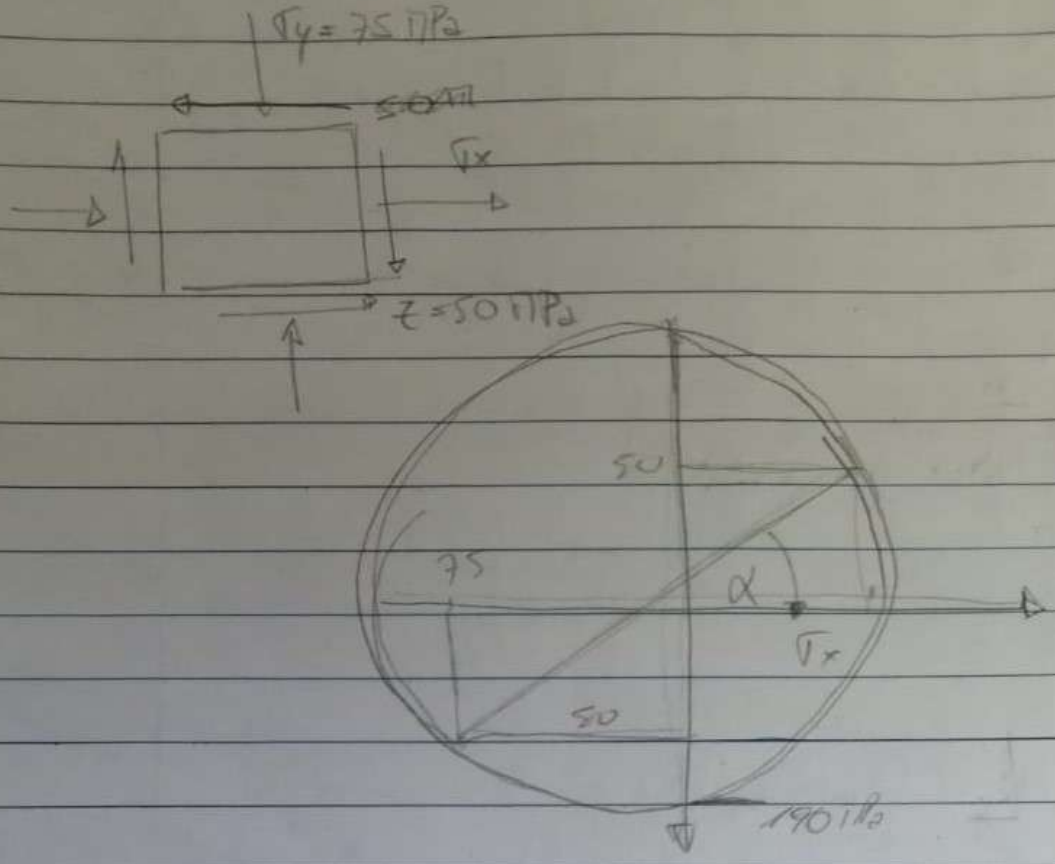
2) $\rightarrow M_R = 8,61 Nm$ — 4) $F_{bz} = 107,63N$

3) $\rightarrow F_c = 17,64N$ — 5) $F_d = 120,73$

$Co =$ — 6) $F_R = 122,25N \rightarrow k = \frac{F_R}{\Delta x}$

$\boxed{k = 3056 N/m}$

Ejercicio 2



$$\tau_{max} = R = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau^2} = 190\ MPa$$

$$\sigma_x = \sqrt{190^2 - \tau^2} \times 2 + \sigma_y$$

$$\boxed{\sigma_x = 291\ MPa} \rightarrow b = 100\ MPa$$

$$\alpha = Tg^{-1}\left(\frac{\tau}{\sigma_x - b}\right) = 15,3°$$

→ giro ~~7,65~~

Ejercicio 3

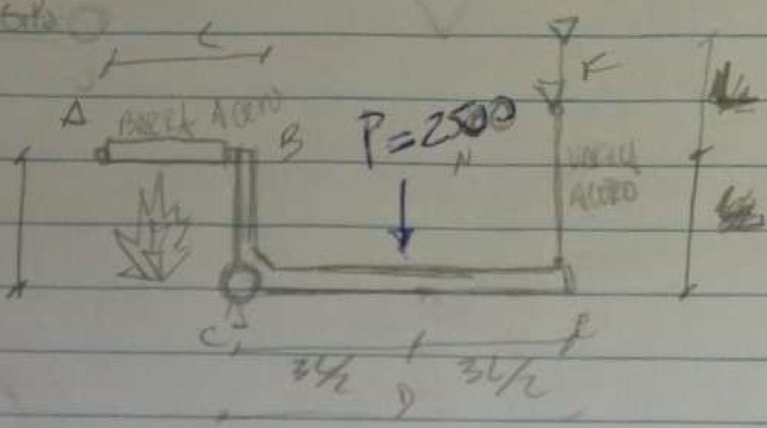
$A_V = 0,4\ cm^2$

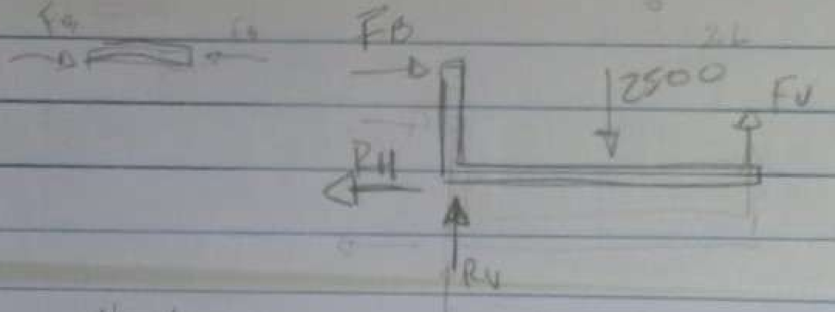
$A_{ab} = 2\ cm^2$

$\alpha = 11,7 \times 10^{-6}$

$E = 210\ GPa$

$L = 0,5\ m$





Newton

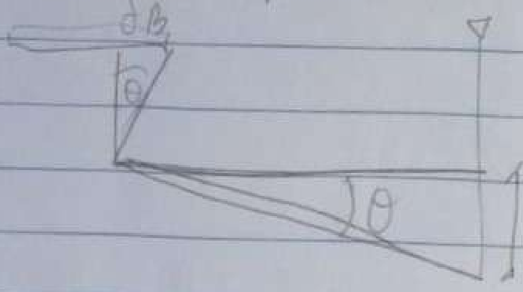
$\Sigma F_V = 0 \Leftrightarrow F_V + R_V = 2500\ N$ 1)

$\Sigma F_H = 0 \Leftrightarrow F_B = R_H$ 2)

$\Sigma M_C = 0 \Leftrightarrow L F_B = -\frac{3L \times 2500}{2} + 3L F_V$ 3)

4 inc x 3 ecs → HE

cond de def



$\delta_V = 3\delta_B$

$\frac{F_V \cdot 2L}{E A_V} = 3\left(\alpha L \Delta T - \frac{F_B \cdot L}{E A_{ab}}\right)$

→ $F_V = 3\alpha E \Delta T A_V - 3F_B \frac{A_V}{A_{ab}}$ 4)

$\frac{1}{4} \Rightarrow 3)$ $F_B = \frac{-3 \times 2500}{2} + 3 \cdot \left(3 \alpha L \Delta T . A_{ab} . E - 3 F_B \frac{\Delta v}{A_{ab}} \right)$

$\left(\frac{M_{fz}}{AE} \right)$

$F_B = \frac{-3750 + 48.648,6}{2,8}$ $\rightarrow$ $F_B = 16.035\ N$

$\Rightarrow$ $\sigma_B = 80,2\ MPa$

$\rightarrow$ $T_v = 22.811,4\ N$ $\longrightarrow$ $\sigma_v = 570\ MPa$

$\delta_v = \frac{T_v . L \times 2}{E . A_v}$ $\rightarrow$ $\delta_v = 2,7\ mm$

$\hookrightarrow$ $\delta_D = 1,35\ mm$