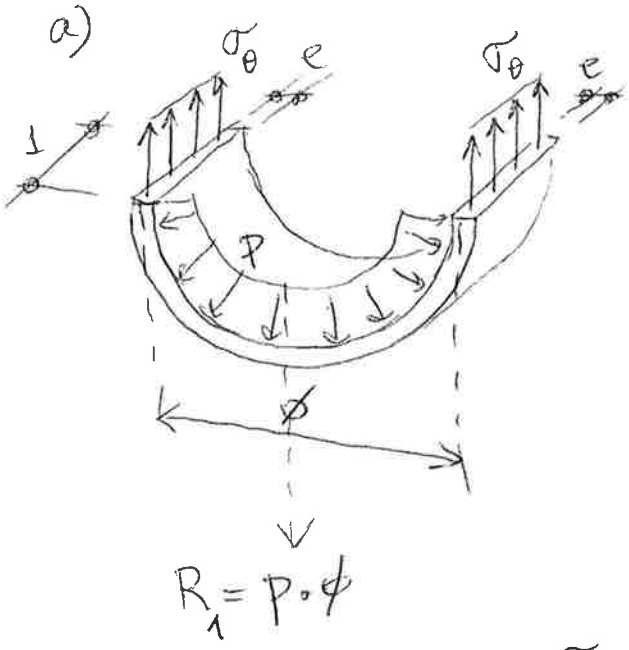
Q2.

a)



$R_1 = p \cdot \phi$

Admitindo tensão de tração uniforme na espessura "e":

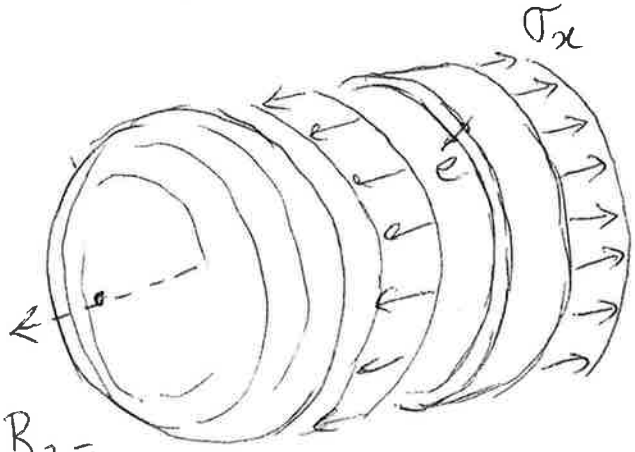
$$p \cdot \phi = 2 \cdot \sigma_\theta \cdot e$$

$$\boxed{\sigma_\theta = \frac{p\phi}{2e}}$$

E, na direção longitudinal:

$$\frac{p \cdot \pi \cdot \phi^2}{4} = \sigma_x \cdot \pi \cdot \phi \cdot e$$

$$\boxed{\sigma_x = \frac{p\phi}{4e}}$$



$$R_2 = \frac{p \cdot \pi \cdot \phi^2}{4}$$

b) Tensões causadas por "g" e "p" no ponto "C" da ST b-b:

- g
$$\begin{cases} \sigma = \frac{My}{I} = \frac{976{,}375 \times 1{,}505}{0{,}1071} = 13.720 = 13{,}72 \text{ MPa (T)} \\ \tau = 0 \end{cases}$$

- P
$$\begin{cases} \sigma_\theta = \frac{0{,}2 \times 3{,}01}{2 \times 0{,}01} = 30{,}1 \text{ MPa (T)} \\ \sigma_x = \frac{0{,}2 \times 3{,}01}{4 \times 0{,}01} = 15{,}05 \text{ MPa (T)} \end{cases}$$

c) No ponto "C", o estado triplo será caracterizado por

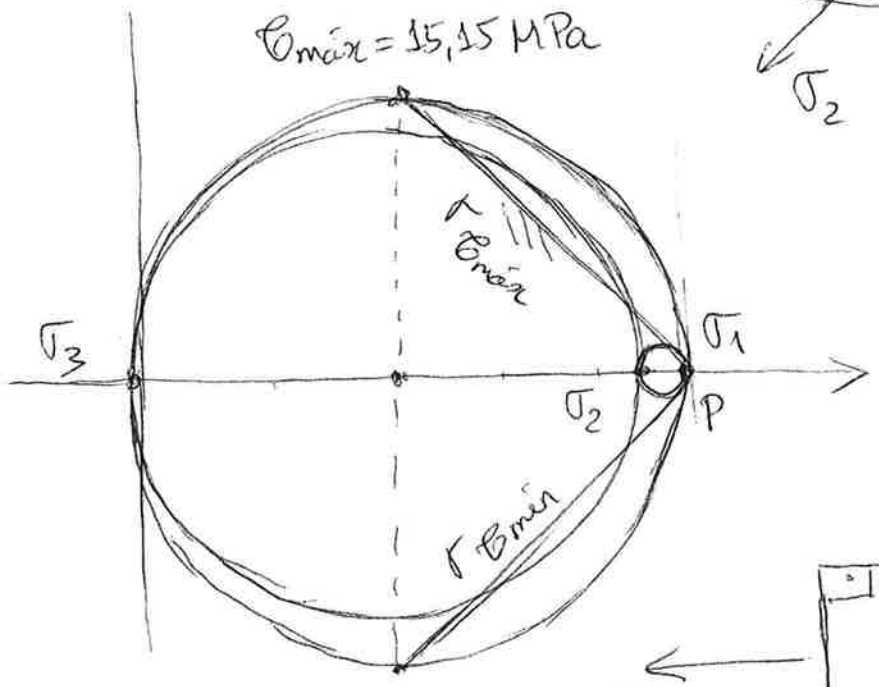
$$\sigma_1 = \sigma_\theta = 30,1 \text{ MPa}$$

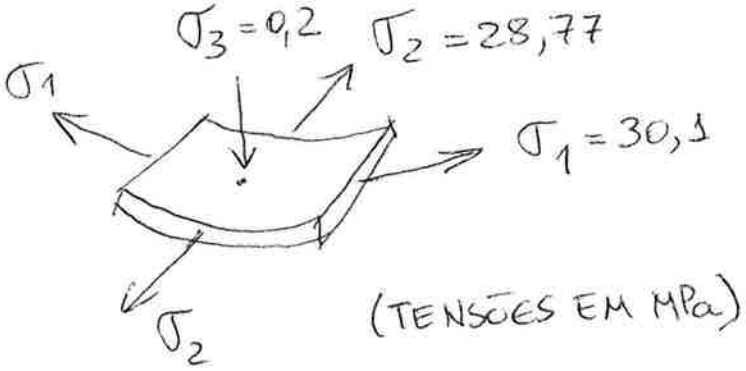
$$\sigma_2 = \sigma_x = 13,72 + 15,05 = 28,77 \text{ MPa}$$

$$\sigma_3 = p = -0,2 \text{ MPa} \ (*)$$

(*) desprezando o peso do fluido, que equivale a $\rho g h$ - se $g = 10 \text{ KN/m}^3$, teríamos $\cong 0,03$ MPa.

No Círculo de Mohr.





(TENSÕES EM MPa)