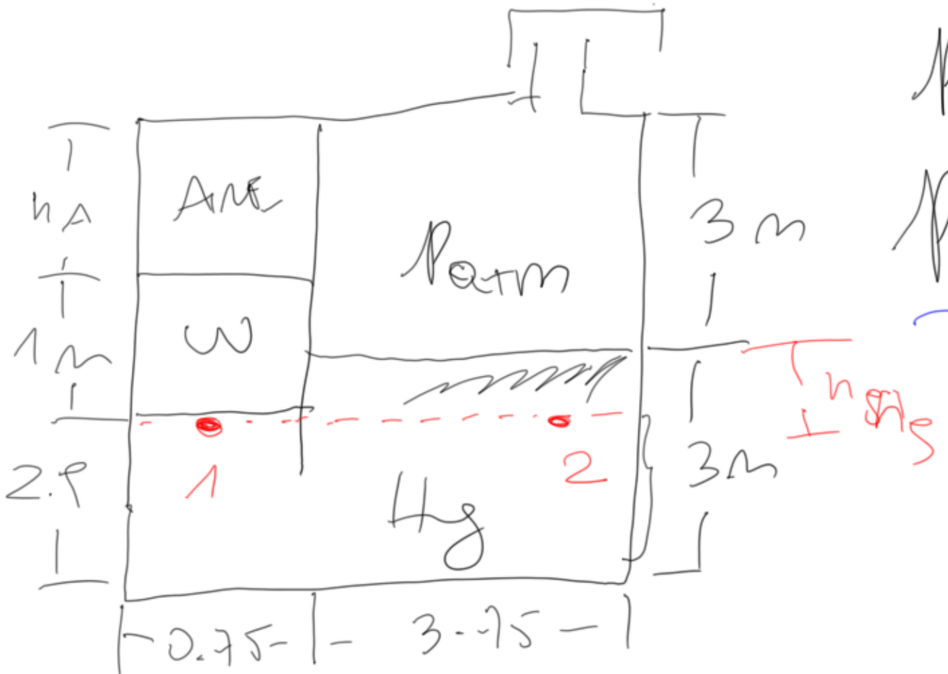
$$\gamma_w = \rho_w \cdot g = 1000 \frac{kg}{m^3} \cdot 9.81\ m/s^2$$

$$\gamma_{Hg} = \rho_{Hg} \cdot g = SG_{Hg} \cdot \rho_{w(@4°C)} \cdot g = 13.56 \cdot 9.81 \cdot 10^3\ Pa/m$$

$13.56 \rightarrow SG = \frac{\rho_i}{\rho_R}$

$p_{atm} \approx 101\ kPa$



$$p_1 = p_2$$

$$p_{aire} + \gamma_w \cdot h_w = p_{atm} + h_{Hg} \cdot \gamma_{Hg}$$

$$3m = 2.9m + h_{Hg} \Rightarrow h_{Hg} = 0.1m$$

Problema 1a

$$(P_{AIRE} - P_{ATM}) = h_{Hg}\gamma_{Hg} - h_w\gamma_w$$

$$P_{AIRE,MAX} = h_{Hg}\gamma_{Hg} - h_w\gamma_w$$

$$= (SG_{Hg}\cdot\gamma_w)\cdot h_{Hg} - h_w\gamma_w$$

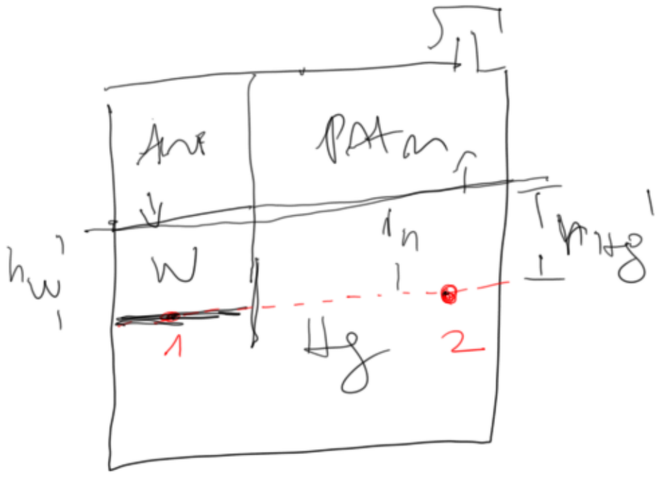
$$= \gamma_w(SG_{Hg}h_{Hg} - h_w)$$

$$= 9.8\times10^3\ \frac{Pa}{m}\ (13.56\cdot 0.1m - 1m) = 3.5\times10^3\ \frac{Pa}{m}$$

$$P_{AIRE,MAX} = 3.5\ kPa$$

Problema 1a

Problema 1b



$h'_{Hg} > h_{Hg}$

$h'_{Hg} = h_w$

$P_1 = P_2$

$P_{aire} + h_w \gamma_w = P_{atm} + h'_{Hg} \gamma_{Hg}$

$1m \quad 1m$

$(P_{aire} - P_{atm}) = h'_{Hg} \gamma_{Hg} - h_w \gamma_w$

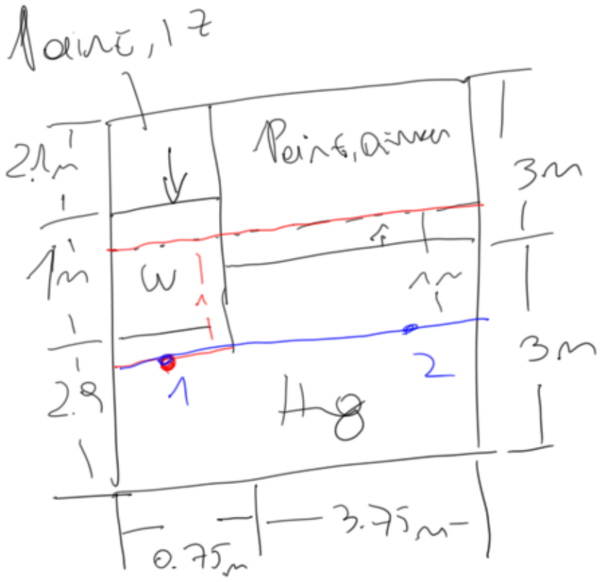
$P_{aire,man} = h'_{Hg} SG_{Hg} \gamma_w - h_w \gamma_w$

$P_{aire,man} = h_w (\gamma_w SG_{Hg} - \gamma_w)$

$P_{aire,man} = h_w \gamma_w (SG_{Hg} - 1)$

$P_{aire,man} = 1m \cdot 9.8 \frac{kPa}{m} (13.56 - 1)$

$P_{aire,man} = 123.1 \ kPa$



$$T = T_0$$

$$p(T=T_0) = p_{atm}$$

$$\boxed{p = \rho R T}$$

$$p_1 = p_2$$

$$p_{aire,1z} + h_w \gamma_w = p_{ein,dcha} + h_{Hg} \cdot \gamma_{Hg}$$

Problema 1c

$$p = \rho R T$$

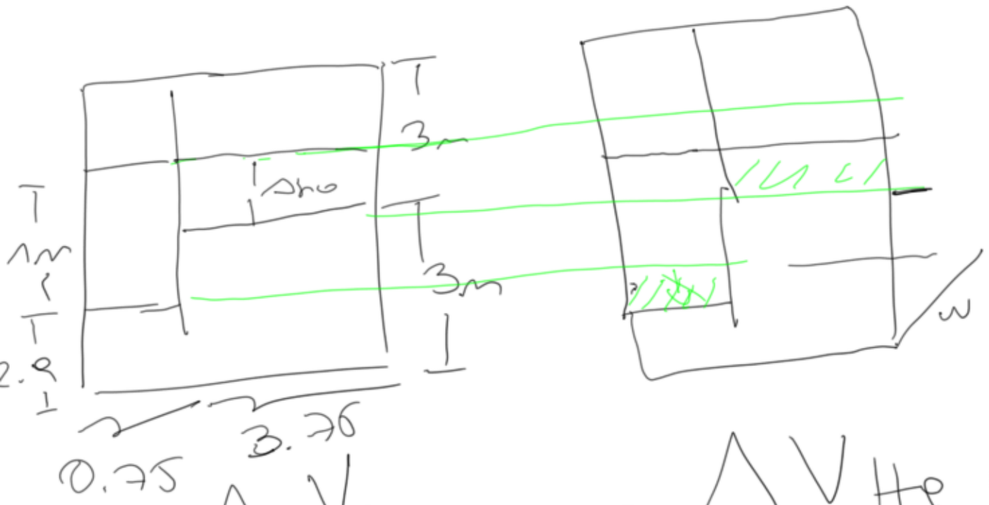
$$\frac{p_1}{p_0} = \frac{\rho_1 R T_1}{\rho_0 R T_0} \; ; \quad T_1 = T_0$$

$$\frac{p_1}{p_0} = \frac{\rho_1}{\rho_0} = \frac{\frac{m_1}{V_1}}{\frac{m_0}{V_0}} \Rightarrow \boxed{\frac{p_1}{p_0} = \frac{V_0}{V_1}}$$

Problema 1c

Problema 1c

$$\frac{p_1}{p_0} = \frac{V_0}{V_1}$$



$$\Delta h_o = h_{L,o} - h_{Ro}$$

$$\Delta h_o = (2.9+1) - 3m$$

$$\Delta h_o = 0.9$$

$$\Delta h_o = \Delta H_{iz} + \Delta H_{DER}$$

$$\Delta V_{Hg,IZ} = \Delta V_{Hg,DER}$$

$$\Delta H_{IZ} \cdot A_{IE} = \Delta H_R \cdot A_{DER}$$

$$\Delta H_{IZ} \cdot W \cdot l_{IZ} = \Delta H_{DER} W \cdot l_{DER}$$

$$\Delta H_{IZ} = \Delta H_{DER} \cdot \frac{l_{DER}}{l_{IZ}}$$

$$\Delta H_{IZ} + \Delta H_{DER} = 0.9$$

$$\Delta H_{IZ} = \Delta H_{DER} \cdot \frac{3.75}{0.75}$$

$$\Delta H_{IZ} = 0.75m$$

$$\Delta H_{DER} = 0.15m$$

Problema 1c

$$\frac{P_1}{P_0} = \frac{V_0}{V_1} = \frac{H_{Ain,0} \cdot A_E}{H_{Ain,1} \cdot A_E}$$

$$= \frac{H_{Ain,0}}{H_{Ain,1}} = \frac{H_{Ain,0}}{H_{Ain,0} - \Delta H_{Den}} = \frac{3\,m}{3m - 0.15}$$

$$\Rightarrow P_1 = P_0 \cdot \frac{3}{3 - 0.15}$$

$$P_{17} + h_w \gamma_w = P_0 \cdot \frac{3}{3 - 0.15} + h_{Hg} \gamma_{Hg}$$

P_{Den}

$$\boxed{P_0 = 101\ kPa}$$

$$P_{12} = \frac{3}{3-0.15} \cdot (101\ kPa) + 123.1\ kPa$$

$$\boxed{P_{12} = 128.4\ kPa}$$

problema 1c