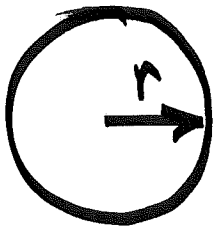
11/16/23

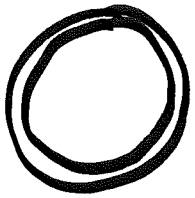
* Liquid Drop:



$$P_c = \sigma\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$$

$$= \sigma\left(\frac{1}{r} + \frac{1}{r}\right) = \frac{2\sigma}{r}$$

* Spherical soap bubble:



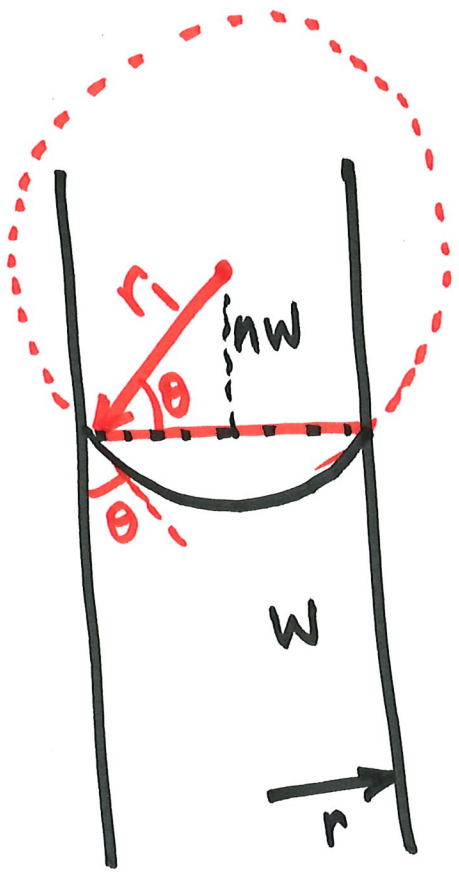
$$P_c = 2\left(\frac{2\sigma}{r}\right)$$

* Flat surface:

$$P_c = 0$$

Capillary Rise Experiment:

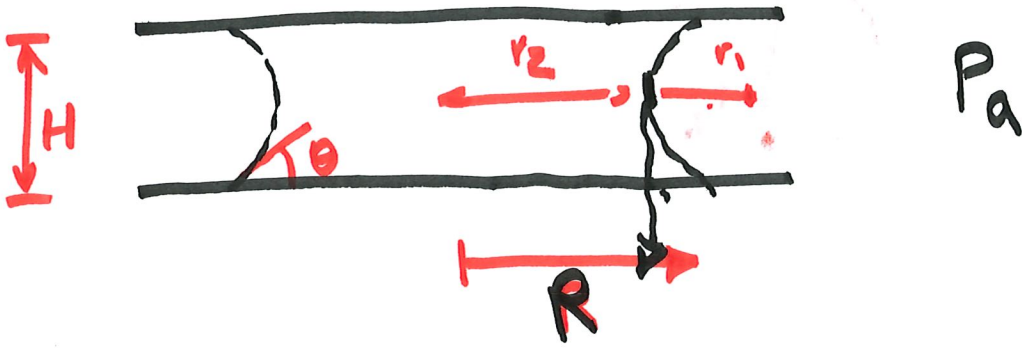
$$P_c = \sigma\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$$



$$r_1 = \frac{r}{\cos\theta} = r_2$$

$$\Rightarrow \boxed{P_c = \frac{2\sigma\cos\theta}{r}}$$

Example:



$$P_c = P_{air} - P_{film}$$

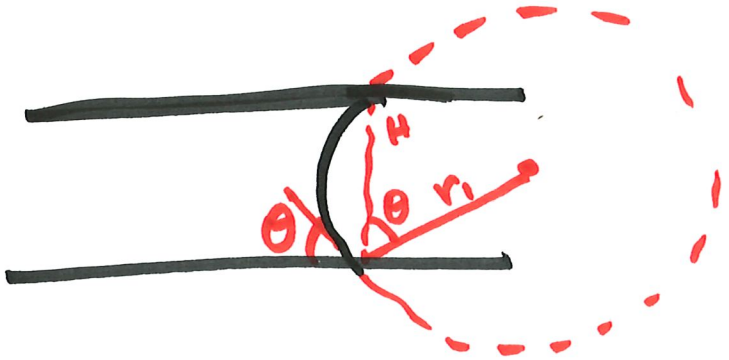
$$\rightarrow P_{film} = P_{air} - P_c$$

$$P_c = G\left(\frac{1}{r_1} + \frac{1}{r_2}\right)$$

$$r_1 = \frac{H/2}{\cos\theta}$$

$$r_2 = R$$

$$\rightarrow P_c = G\left[\frac{2\cos\theta}{H} - \frac{1}{R}\right]$$



$$r_1 \cos\theta = \frac{H}{2} \rightarrow r_1 = \frac{H/2}{\cos\theta}$$

$$P_{film} = P_{air} - \sigma\left[\frac{2\cos\theta}{H} - \frac{1}{R}\right]$$

$\theta = 0$

$R = 1\ cm$

$H = 5\ \mu m$

$\sigma = 72\ dynes/cm$

$$P_{film} = 1{,}013{,}250 - 72\left[\frac{2}{0.005} - \frac{1}{1}\right]$$

$$= 725{,}322 \text{ dynes/cm}^2$$

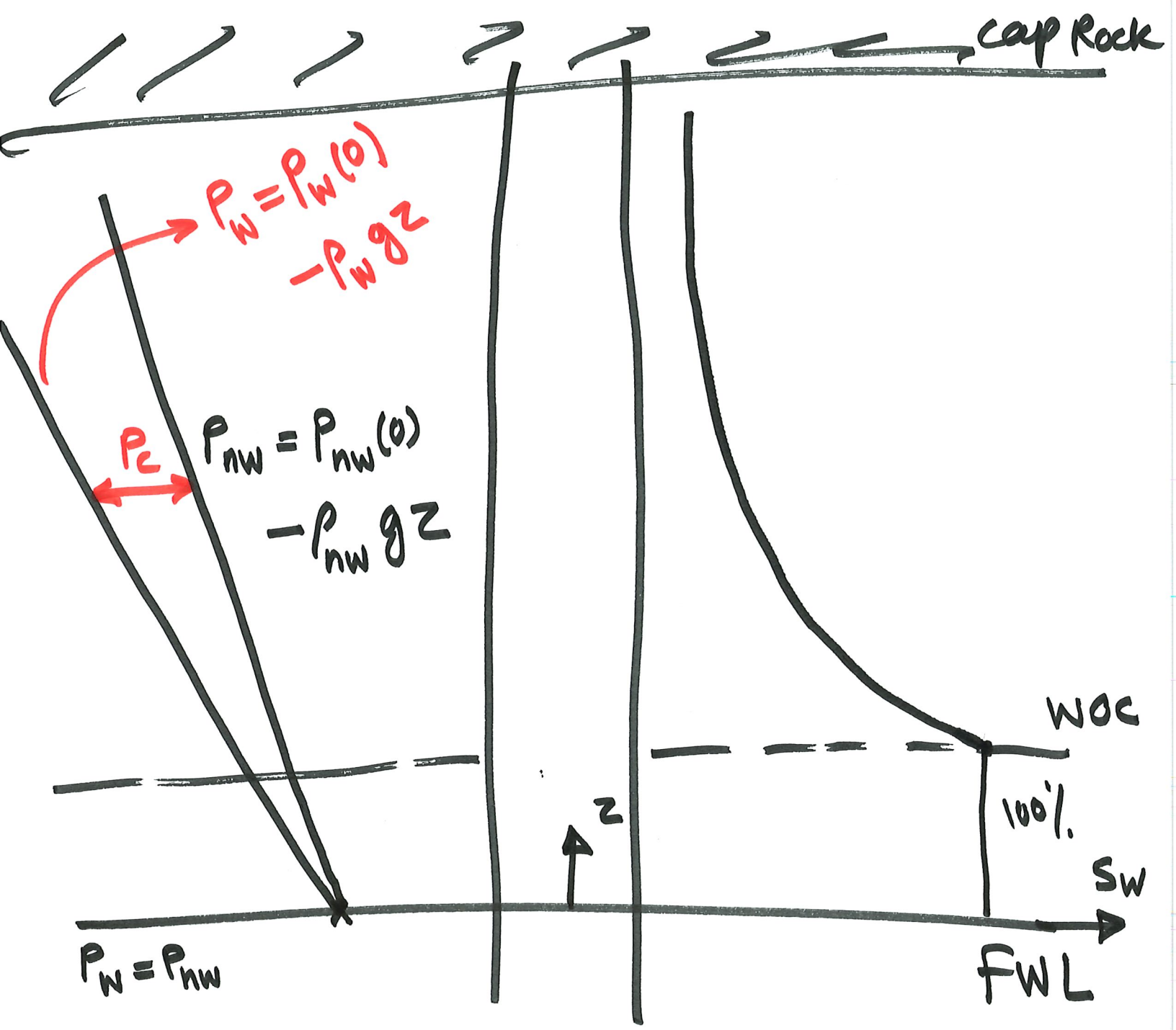
$$\approx 0.7 \text{ atm}$$

$$F = P_c \cdot A$$

$$= 72\left[\frac{2}{0.005} - 1\right] \cdot \pi(1)^2$$

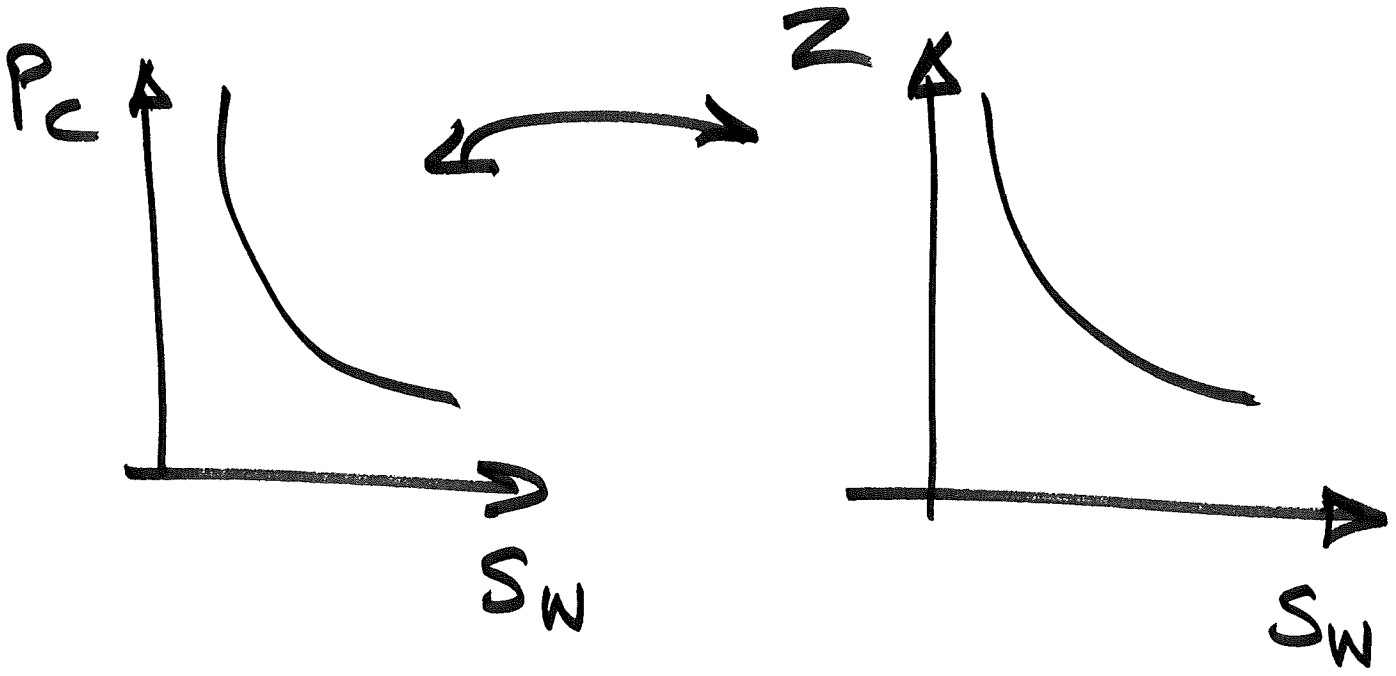
$$= 904{,}553 \text{ dynes}$$

$$\approx 9 N$$



$$P_c = P_{nw}(0) - \rho_{nw} g z - [P_w(0) - \rho_w g z)$$

$$\rightarrow P_c = (\rho_w - \rho_{nw}) g z$$


P_c
S_w
z
S_w