Hw 1.2

terça-feira, 10 de setembro de 2024 15:09

3.6 - true

the calculation of gauge pressure is the subtraction of the atmospheric pressure from the absolute value, so unless we are working at a vacuum where P_{atm} is zero the atmospheric pressure will always be higher than gauge pressure

3.7 - False

the atmospheric pressure at sea level is 14.7 psia, but we have different elevations and the higher the elevation, the lower the pressure is. so the pressure at the top of Mount Everest its around 4.54 psia which is way lower than 14.7

3.8 - False

the values of absolute pressure can't be negative, it is absolute

3.9 - true

if the pressure is measured in a atmospheric pressure at sea level we can calculate absolute pressure as:

$$P_{abs} = P_{gauge} + P_{atm} = -4.65 + 14.7$$

$$P_{abs} = 10.05$$

$P_{Abs} > 0$, so the statment is true and can be real.

3.10 - False

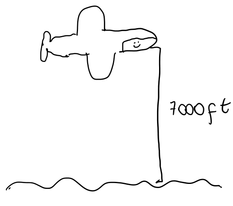
similar as the scenario above, we calculate the absolute pressure as following:

$$P_{abs} = P_{gage} + P_{atm} = -175 + 101.32$$

$$P_{abs} = -73.68$$

since P_{abs} is negative and that is not possible since it always have to be a positive number, than the ocerario is not possible or false

3.11



$$\Delta P = \gamma h$$

$P_1 = 14.7$ psi

$\gamma_{air} = 0.0764\ lb/ft^3$

$$\Delta P = 0.0764 \frac{lb}{ft^3} \times 7000 ft = 534.8 \frac{lb}{ft^2}$$

$$\Delta P = 534.8 \frac{lb}{ft^2} \left(\frac{1\ ft^2}{144\ in^2} \right) = 3.7138 \frac{lb}{in^2} = 3.7138\ psi$$

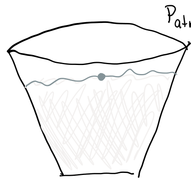
$$P_1 - P_2 = \Delta P$$

$$P_1 = \Delta P + P_2 \rightarrow 14.7 = 3.7138 + P_2$$

$$P_2 = 14.7 - 3.7138$$

$$P_2 = 10.9862\ psi$$

3.13



$P_{atm} = 14.7$ psi

$P_{abs} = P_{atm} + \rho g h$ ($h = 0$ so $\rho g h = 0$)

$P_{abs} = P_{atm}$

$P_{gage} = P_{abs} - P_{atm}$

since P_{abs} and P_{atm} are the same than they will cancel it out and will make the P_{gage} be 0

P_{gage} is 0 since only pressure at the surface is the ATM pressure