MET 330 Homework #2 Ch: 3 6-10, 11, 13, 41, 62, 83, 90, 94 Sherron Over

3.6 The value for absolute pressure will always be greater than gauge pressure.
True, because $P_{abs} = P_{gage} + P_{atm}$. $P_{atm} > 0$ always

3.7 As long as you stay on the surface of the earth. The P_{atm} will be 14.7
False, atmospheric pressure varies with elevation. So if there was someone on an Sky Scrapper the would experience less atmospheric pressure than someone at sea level.

3.8 The pressure in a certain tank is -55.8 Pa (abs) $P_{abs} \nless 0$
False, there is no negative absolute pressure value.

3.9 The pressure in a certain tank is -55.8 Pa (abs) $P_{abs} \nless 0$
False, there is no negative absolute pressure value.

3.10 The pressure in a certain tank is -150 kPa (gage)

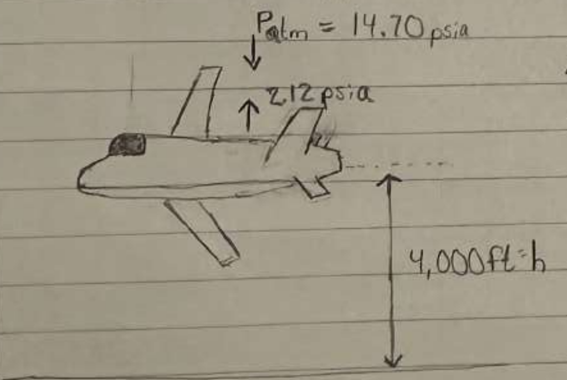
$P_{abs} = P_{gage} + P_{atm}$

P_{abs} -150 kPa + 101.3 kPa

P_{abs} = -48.7 kPa

False, there is no negative absolute pressure.

3.11



$\gamma = 0.0764\ lb/ft^3$

$\Delta P = \gamma \times h$

$\Delta P = (0.0764\ lb/ft^3)(4{,}000\ ft)$

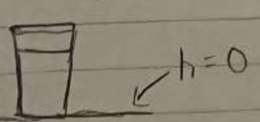
$\Delta P = 305.6\ lb/ft^2 \left(\frac{1ft^2}{(12in)^2}\right) = 2.12\ lb/in^2$ or psia

$P = P_{atm} - \Delta P$

$P = 14.70\ psia - 2.12\ psia$

$P = 12.58\ psia$

3.13 In gage Pressure, what is the pressure at the surface of a glass of milk



$P_{abs} = P_{atm} + \rho g h \rightarrow 0$

$P_{abs} = P_{atm}$

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

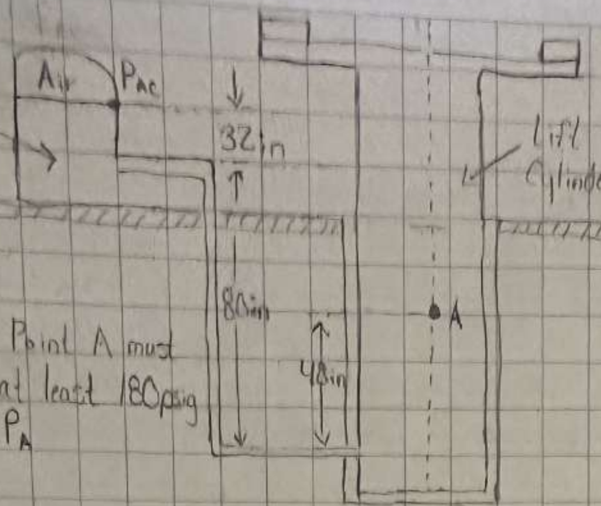
$P_{gage} = P_{atm} - P_{atm}$

$P_{gage} = 0$

Zero gage pressure

3.41

0.1 S.G 0.90



If Point A must be at least 180 psig P_A

$P_{AC} + \gamma h_{oil} = 180$ psig

$P_{AC} + S.G\,\rho h = 180\ lb/in^2$

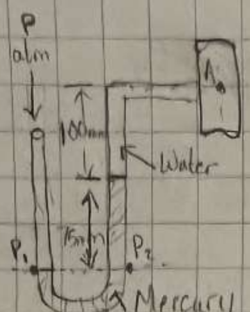
$P_{AC} + (0.90)\left(\frac{62.4\ lb}{ft^3}\right)\left(\frac{1\ ft^3}{(12\ in)^3}\right)(h) = 180\ lb/in^2$

$P_{AC} + 0.0325\ \frac{lb}{in^3}\ ((32+80)-48)\ in = 180\ lb/in^2$

$P_{AC} + 2.08\ lb/in^2 = 180\ lb/in^2$

$P_{AC} = 177.92\ lb/in^2$

3.62



$SG = 13.54$

$\rho_w = 1{,}000\ kg/m^3$

$\rho_m = 13.54\,(1000\ kg/m^3) = 13{,}540\ kg/m^3$

$P_1 = P_2$

$P_{atm} = P_1$

$P_2 = P_A + \rho_w g h_w + \rho_m g h_m$

$P_2 = P_A + (1000\ kg/m^3)(9.81\ m/s^2)\left(100\ mm \times \frac{1\ m}{1000\ mm}\right) + (13{,}540\ kg/m^3)(9.81\ m/s^2)\left(75\ mm\ \frac{1\ m}{1{,}000\ mm}\right)$

$P_2 = P_A = 981.0\ Pa + 9{,}962.055\ Pa$

$P_2 = P_A + 10{,}943.055\ Pa\left(\frac{1\ kPa}{1000\ Pa}\right)$

$P_{atm} = P_A + 10.943\ kPa$

$P_A - P_{atm} = -10.943\ kPa$

$P_{gage} = -10.943\ kPa$

3.83 30.65 in Hg, what

$30.65\ in_{Hg} \left|\ \frac{25.4\ mm}{1\ in}\ \right|\ \frac{1\ atm}{760\ mm\ Hg}\ \left|\ \frac{14.7\ psia}{1\ atm}\right. = 15.06$ psia

3.90 Vacuum Chamber Pressure -68.2 kPa, what is this in mm Hg

$P = -68.2\ kPa\left(\frac{1000\ Pa}{1\ kPa}\right)$

$P = -68{,}200\ N/m^2$

$P = \rho g h$

$h = \frac{P}{\rho g} = \frac{68{,}200\ N/m^2}{(13.6)(1000\ kg/m^3)(9.81\ m/s^2)}$

$h = 0.511\ m\left(\frac{1{,}000\ mm}{1\ m}\right) = 511.2$ mm Hg

3.94