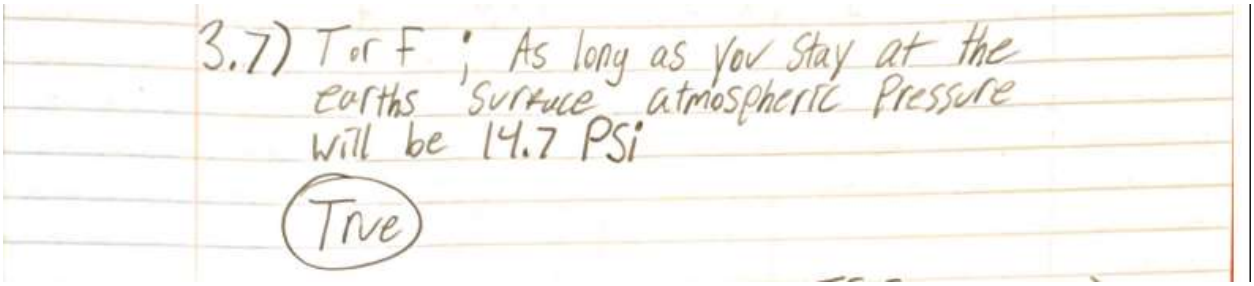
Homework 1.2

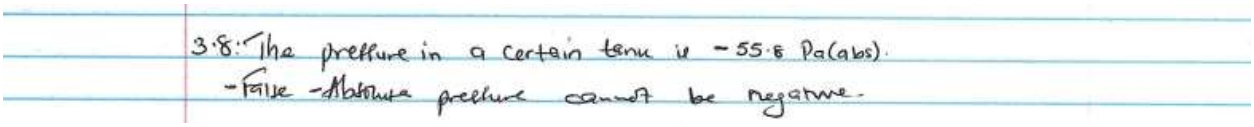
Robert Morris, Gavin Cotton, Naftaly Gichunga, Trey Ward

6.

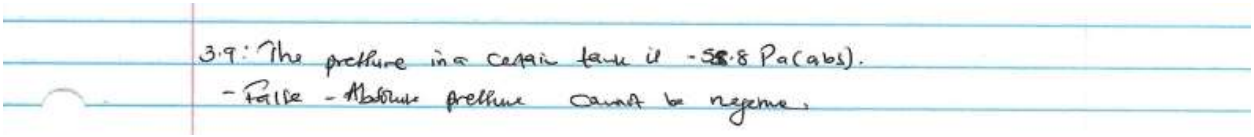
7.



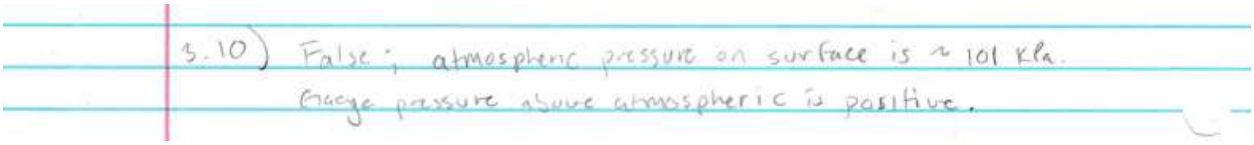
8.



9.



10.



11.

3.11) If you were to ride in a open-Cockpit airplane to an elevation of 4000 ft above Sea level, what would atmospheric pressure be if it Conforms to Standard atmosphere

$\Delta p = \gamma_{Air} \cdot h$

$h = 4000\ ft$

$P_1 = 1\ atm = 14.7\ PSi$

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

$P_2 = P_1 - \Delta P$

$\Rightarrow \Delta P = 0.0764 \frac{lb}{ft3} \cdot 4000 \frac{lb}{in^2} = 305.6 \frac{lb}{12\ in^2}$

$\Rightarrow 305.6 \frac{lb}{ft^2} = 2.12 \frac{lb}{in^2} = 2.12\ PSi$

$\Rightarrow P_2 = P_1 - P_2 = 14.7\ PSi - 2.12\ PSi$

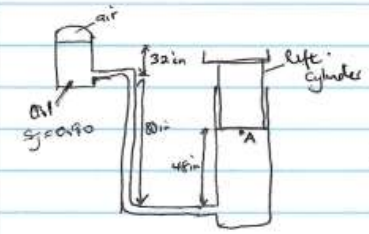
$P_2 = 12.57\ PSi$

13.

3.13) $\emptyset$ Pa (gage). Exposed to atmosphere

41.

Problem 3.41



What must the air pressure be if the pressure at point A has to be at least 180 psig

$P_{air} + \gamma_{oil}(32in) + \gamma_{oil}(80in) - \gamma_{oil}(48in) = 180\ psig$

$P_{air} = 180\ psig - (64in)\gamma_{oil}$

$sg = \frac{\gamma_{oil}}{\gamma_{H_2O@4°C}}$ $\quad \gamma_{oil} = 0.9 \times 62.4 \frac{lb}{ft^3} \times \frac{ft^3}{(12in)^3}$

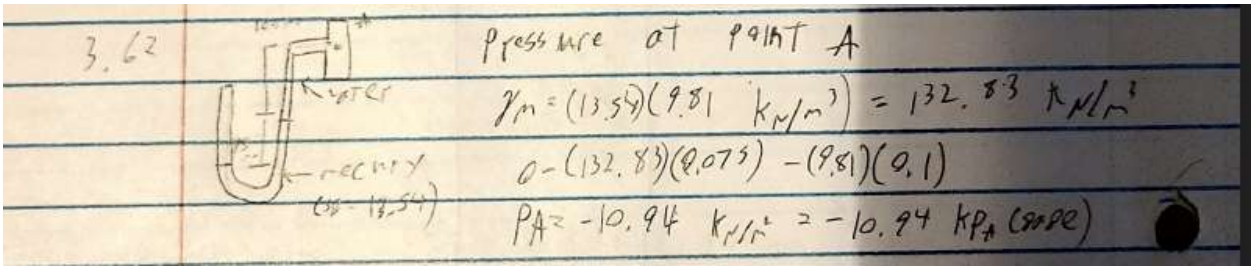
$= 0.0325\ lb/in^3$

$P_{air} = 180\ psi - (64in \times 0.0325\ lb/in^3)$

$= 180\ psig - 2.08\ psia$

$\boxed{P_{air} = 177.92\ psig}$

62.



Pressure at point A

$\gamma_m = (13.54)(9.81\ kN/m^3) = 132.83\ kN/m^3$

$0 - (132.83)(0.075) - (9.81)(0.1)$

$P_A = -10.94\ kN/m^2 = -10.94\ kPa\ (gage)$

83.

3.83) A barometer indicates Atmospheric Pressure to be 30.65 in of Mercury. Find pressure in psia

$\gamma_m = 848.7 \frac{lb}{ft^3}$ $\quad h = 30.65\ in$

$\Rightarrow \gamma_m = 848.7 / 12^3 = 0.4911 \frac{lb}{in^3}$

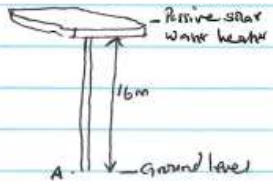
$\Rightarrow P_{atm} = 0.4911 \frac{lb}{in^3} \cdot 30.65\ in = \boxed{15.05\ PSI}$

90.

3.90 | pressure is -68.2 KPA ∴ HJ = -68.2 (760/101.325) = -511.542 mm Hg

94.

Problem 3.94



Gauge pressure at point A in kPa

$P_A(\text{gage}) = \gamma_w h$ $\quad \gamma_w = 9.81 \text{ kN/m}^3$, $h = 16 \text{ m}$

$P_A = 9.81 \text{ kN/m}^3 \times 16 \text{ m}$

$P_A = 156.96 \text{ kN/m}^2$

$P_A = 156.96 \text{ kPa (gage)}$