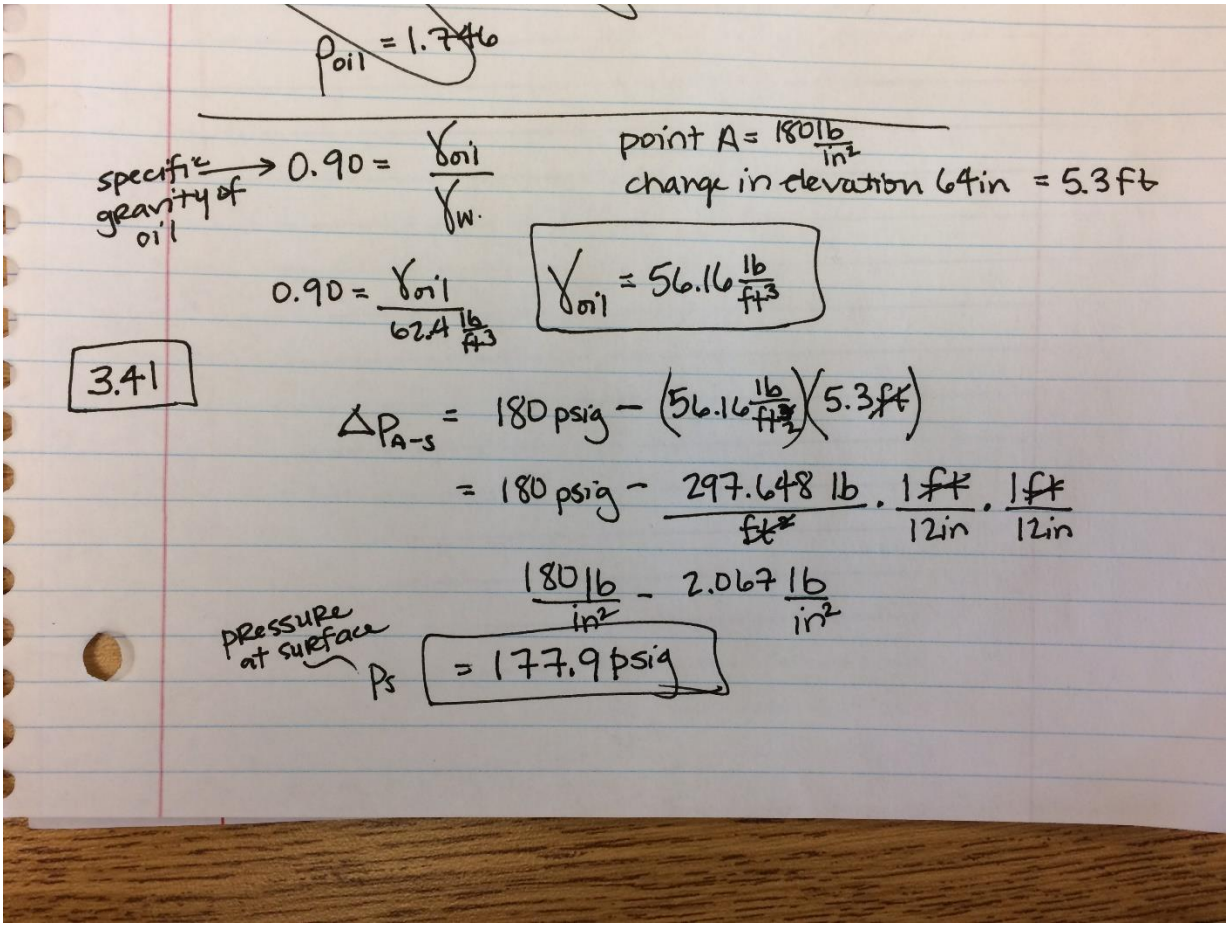
Becca Sopher

Homework 1.3

Due: 9.19.2017



3.83 A barometer indicates the atmospheric pressure to be 27.56 in of mercury. Calculate the atmospheric pressure in psia.

$\gamma_m h = p_{atm}$

$\gamma_m = 848.7\ lb/ft^3$

$h = 27.56\ in$

$$p_{atm} = \left(\frac{848.7\ lb}{ft^3}\right)\left(\frac{27.56\ in}{1}\right)\left(\frac{1\ ft^3}{1728\ in^3}\right) = \boxed{13.541 lb/in^2}$$

3.90 The pressure in a vacuum chamber is $-98.2\ kPa$. Express this pressure in mm Hg.

$1.0\ mm\ Hg = 133.3\ Pa$ $\qquad 133.3\ Pa \cdot \frac{1\ kPa}{1000\ Pa} = 0.1333\ kPa$

~~133.3 Pa~~

$$\frac{1.0\ mm\ Hg}{.1333} = \frac{.1333\ kPa}{.1333}$$

$= 1\ kPa$

$7.501875\ mm\ Hg = 1\ kPa$

$-98.2 \times 7.501875 = \boxed{-736.68\ mm\ Hg}$

3.94 Passive solar water heater, to be installed on roof of

4.2 The flat left end of the tank is secured with a bolted flange. If the inside diameter of the tank is 30 in & the internal pressure is raised to +24.4 psig, calculate the total force that must be resisted by the bolts in the flange.

$$F = pA \qquad F = \left(\frac{24.4\,lb}{in^2}\right)\left(\pi(15\,in)^2\right)$$

$$\boxed{F = 17{,}247.34\,lb}$$