3.71 If you were to ride in an open-cockpit airplane to an elevation of 4000 ft above sea level, what would the atmospheric pressure be if it confirms to the standard atmosphere?

$h = 4000\,ft$

$P_{atm} = 14.70\ psia$

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

$\Delta p = \gamma h$

$\Delta p = (0.0764\ lb/ft^3)(4000\ ft)$

$\Delta p = 305.6\left(\frac{lb}{(12)^2}\right)$

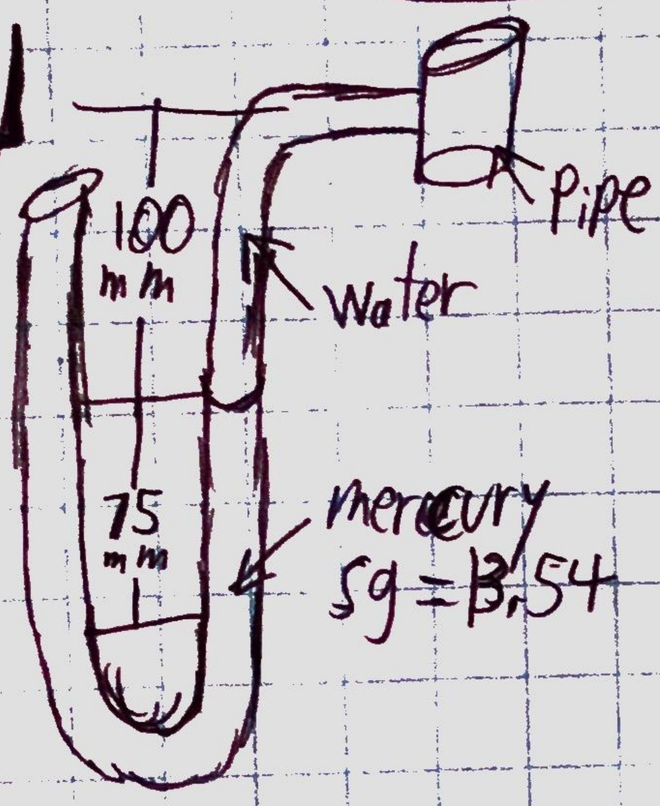
$\Delta p = 2.12\ psia$

$p = p_{atm} - \Delta p$

$p = 14.70\ psia - 2.12\ psia$

$p = 12.58\ psia$

3.62



$P_A + \gamma_w h_w + \gamma_{Hg} h_{Hg} = P_{atm}$

$P_A - P_{atm} = -(\gamma_w h_w + \gamma_{Hg} h_{Hg})$

$(P_A)_{gage} = -(\gamma_w h_w + \gamma_{Hg} h_{Hg})$

$(P_A)_{gage} = -(\gamma_w h_w + \gamma_w sg_{Hg} h_{Hg})$

$(P_A)_{gage} = -(9810 \times 0.1 + 9810 \times 13.54 \times 0.075)$

$= -10943.055\ N/m^2$

$= -10943.055\ Pa$

$= -10.943\ kPa$

3.83 A barometer indicates the atmospheric pressure to be 30.65 in of mercury. Calculate the atmospheric pressure in psia.

$P_{atm} = 30.65\ in\ of\ Hg$

$30.65\ in \times \frac{0.49\ psia}{1\ in}$

$= 15\ psia$