HW Module 1

5/24/22
Logan Moody

1.48 $P = \frac{F}{A}$ $F = 18,000 lbf$ $A = \pi/4\ D^2$ $D = 2.5in$ $P = \frac{18000\,lb}{\frac{\pi}{4} \cdot (2.5in)^2}$ $P = 3666.9$

$\boxed{P = 3666.93 psi}$

1.58 Bulk Modulus $Hg = 3,590,000 psi$ or $24,750 MPa$

$E = \frac{-\Delta P}{\Delta V/V}$ for 1% change $\Delta V/V = -.01$

$\Delta P = 3,590,000 psi \cdot .01 = \boxed{35900 psi}$
$\Delta P = 24,750 MPa \cdot .01 = \boxed{247.5 MPa}$

1.107 $Sg = .79$ $\rho_{water} = 1000 kg/m^3 \pm 1.94 slugs/ft^3$

$\rho_{oil} = .79 \times 1.94 slugs/ft^3 = \boxed{1.537 slugs/ft^3}$

$\rho_{oil} = .79 \times 1000 \frac{kg}{m^3} \times \frac{1000 g}{kg} \times \frac{m^3}{(100 cm)^3} = \boxed{.79 \frac{g}{cm^3}}$

2.17 water, oil, gasoline, kerosene, glycerin

2.18 $6.51 \times 10^{-4}\ Pa \cdot s$ $2.27; \sim 1.8 \times 10^{-7}\ lb \cdot s/ft^2$

2.61 $Sg_{oil} = .94$ Steel weighs $77 kN/m^3 = \gamma_s$
250mm in 10.4sec $\gamma_f = 9.81 \frac{kN}{m^3} \times .94 = \gamma_f = 9.22 \frac{kN}{m^3}$

$V = \frac{.25m}{10.4sec}$ $D =$

$\eta = \frac{(\gamma_s - \gamma_f) D^2}{18 \cdot V} = \frac{(77 - 9.22) kN \cdot 10.4sec \cdot (.0016m)^2}{m^3 \cdot 18 \cdot .25m} \times \frac{1000N}{1kN}$

$\boxed{\eta = .1401 Pa \cdot s}$