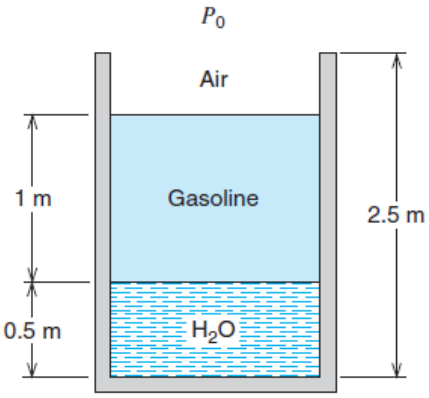
1st Week Problems

Problem 1- A tank has two rooms separated by a membrane. Room A has 1 kg air and volume 0.5 m^3, room B has 0.75 m^3 air with density 0.8 kg/m^3. The membrane is broken and the air comes to a uniform state. Find the final density of the air.

Problem 2- A 2.5-m-tall steel cylinder has a cross-sectional area of 1.5m^2. At the bottom, with a height of 0.5 m, is liquid water, on top of which is a 1-m-high layer of gasoline. This is shown in figure. The gasoline surface is exposed to atmospheric air at 101 kPa. What is the highest pressure in the water?



AE209 Thermodynamics Quiz-1

Quiz Problem 1- A 5-m^3 container is filled with 900 kg of granite (density of 2400 kg/m3). The rest of the volume is air, with density equal to 1.15 kg/m3. Find the mass of air and the overall (average) specific volume. Also find the specific gravity and specific weight of the granite. (ρ_{water} = 997 kg/m^3)

Quiz Problem 2- A steel tank of cross-sectional area 3 m^2 and height 16 m weighs 10 000 kg and is open at the top, as shown in Figure. We want to float it in the ocean so that it is positioned 10 m straight down by pouring concrete into its bottom. How much concrete should we use?