

**SOUTHERN ILLINOIS UNIVERSITY**  
*Department of Civil and Environmental Engineering*

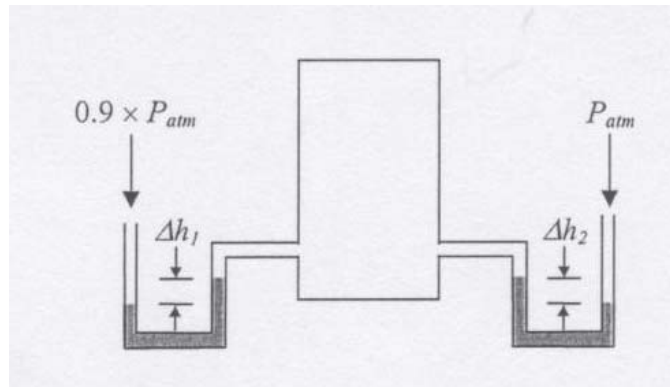
**CE 370- Fluid mechanics**  
 Summer 2009

Assignment-2

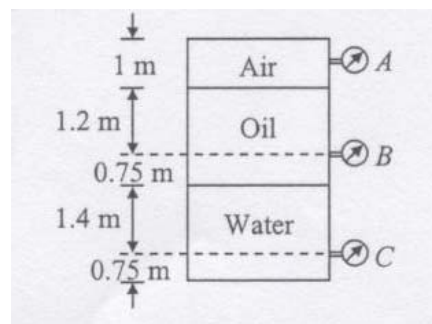
Date Assigned: June 24, 2009

Date Due: June 29, 2009

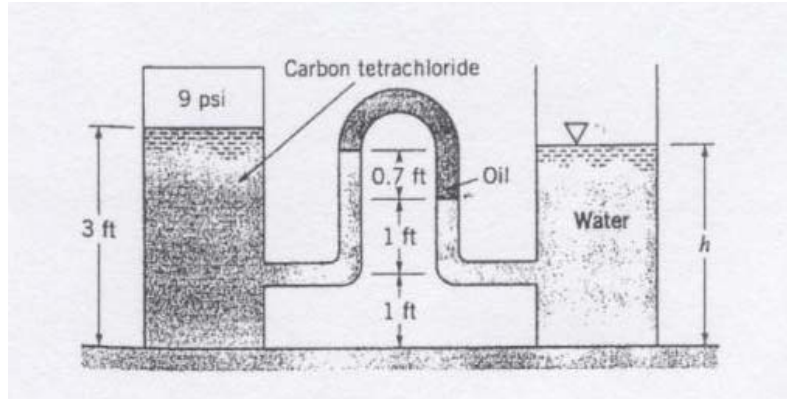
- Two water-filled manometers are connected to a tank of air as shown below. If atmospheric pressure is 105 kPa, what is the difference in deflection between the manometers (i.e.,  $\Delta h_1 - \Delta h_2$ ).



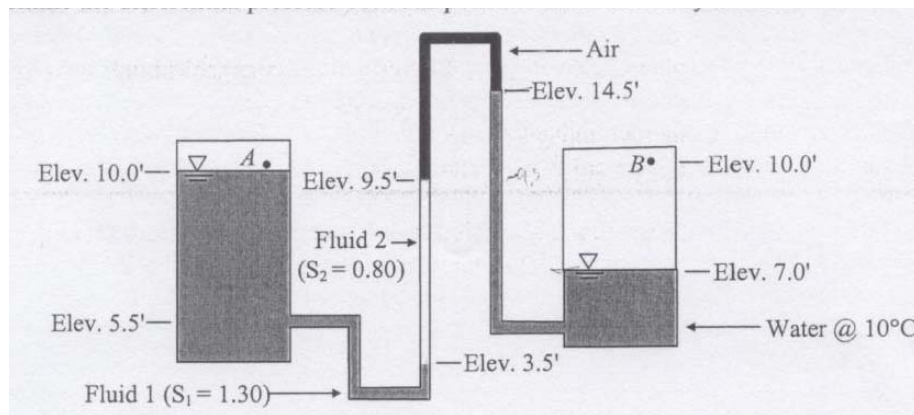
- If  $p_A = 62$  kPa and  $p_B = 70$  kPa in the system shown below, what is the specific gravity of the oil and pressure reading on gauge C?



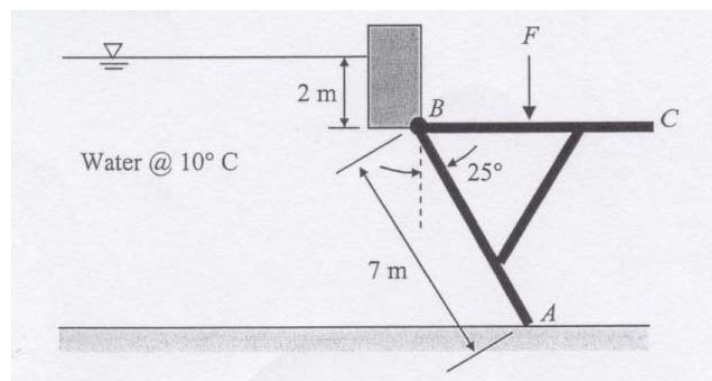
- An inverted U-tube manometer containing oil ( $S=0.8$ ) is located between two tanks as shown below. The tank on the left, which contains carbon tetrachloride ( $S=1.59$ ) is closed to the atmosphere and pressured to 9 psig. The tank on the right contains water and is open to the atmosphere. What is the depth of water,  $h$ , in the tank on the right?



4. Determine the differential pressure between points A and B in the system shown.

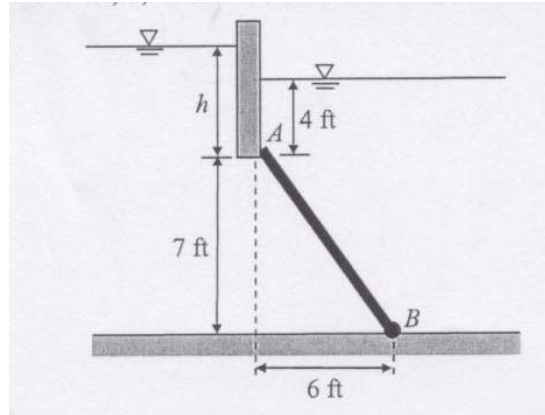


5. Gate ABC shown below has a width of 5m, and the length of each leg ( i.e., AB and BC) is 7 m What force F is required to keep the gate closed. Neglect the weight of the gate, and assume that F acts at the mid point of leg BC.

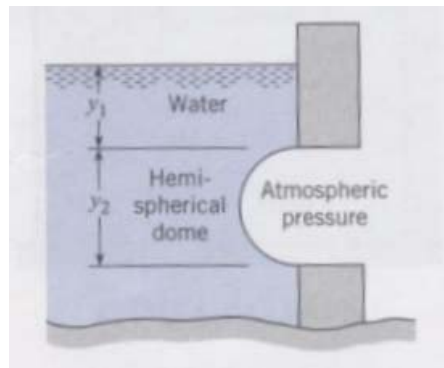


6. Rectangular gate AB shown below is 7 ft wide and weighs 3000 lbs when submerged. It is hinged at B and rests against a smooth wall at A, and fluid on both sides of gate is

water. Determine the water level,  $h$ , on the left side of the tank that will just cause the gate to open.



7. This dome (hemisphere) is located below the water surface as shown. Determine the magnitude and sign of the force components needed to hold the dome in place and the line of action of the horizontal component of force. Here  $y_1=1$  m and  $y_2=2$  m. Assume  $T=10$  degree C.



8. Compute the magnitudes of the horizontal and vertical hydrostatic forces acting on quarter cycle panel of the water tank shown below.

