

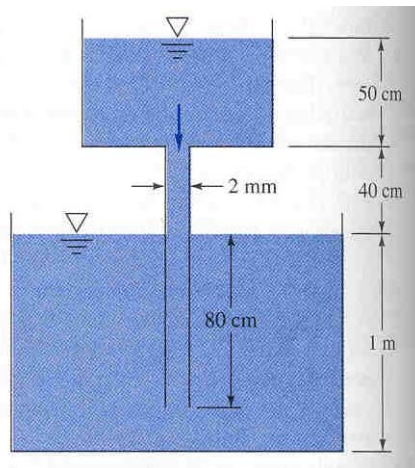
## HW # 11 SP07

#1.

Water flows through an inclined 8-cm-diameter pipe. At sections A and B the following data are taken:  $p_A = 186$  kPa,  $V_A = 3.2$  m/s,  $z_A = 24.5$  m, and  $p_B = 260$  kPa,  $V_B = 3.2$  m/s,  $z_B = 9.1$  m. Which way is the flow going? What is the head loss in meters?

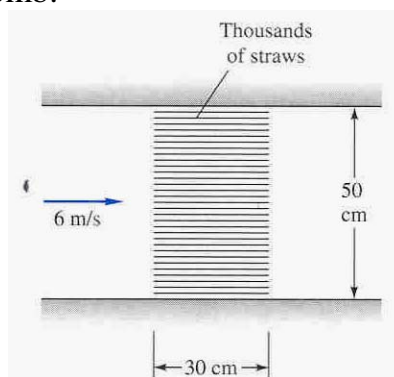
#2.

For the configuration shown in Fig., the fluid is ethyl alcohol and the tanks are very wide. Find the flow rate which occurs in  $\text{m}^3/\text{h}$ . Is the flow laminar?



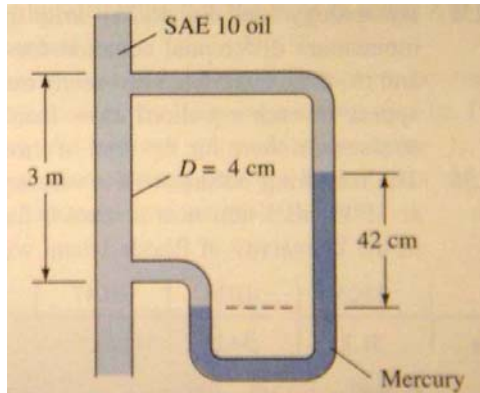
#3.

For straightening and smoothing an airflow in a 50-cm-diameter duct, the duct is packed with a “honeycomb” of thin straws of length 30 cm and diameter 4 mm, as in Fig. The inlet flow is air at 110 kPa and 20°C, moving at an average velocity of 6 m/s. Estimate the pressure drop across the honeycomb.



#4.

SAE 10 oil flows through the 4-cm-diameter vertical pipe of the Fig. For the mercury manometer reading  $h = 42$  cm shown, (a) calculate the volume flow rate in  $\text{m}^3/\text{h}$  and (b) state the direction of flow.



#5.

Water is to be pumped through 2000 ft of pipe from reservoir 1 to 2 at a rate of  $3 \text{ ft}^3/\text{s}$ , as shown in the Fig. If the pipe is cast iron of diameter 6 in and the pump is 75% efficient, what horsepower pump is needed? (Roughness value for cast iron,  $\epsilon = 0.00085 \text{ ft}$ )

