# Fluid Mechanics

## Assignment # 7

**P3.169** Once it has been started by sufficient suction, the *siphon* in Fig. P3.169 will run continuously as long as reservoir fluid is available. Using Bernoulli's equation with no losses, show (*a*) that the exit velocity $V_2$ depends only upon gravity and the distance $H$ and (*b*) that the lowest (vacuum) pressure occurs at point 3 and depends on the distance $L + H$.
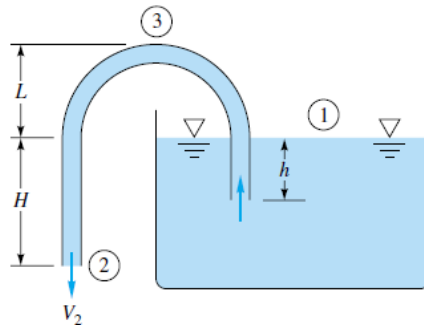


P3.169

**P3.167** In Fig. P3.167 the fluid is gasoline at 20°C at a weight flux of 120 N/s. Assuming no losses, estimate the gage pressure at section 1.
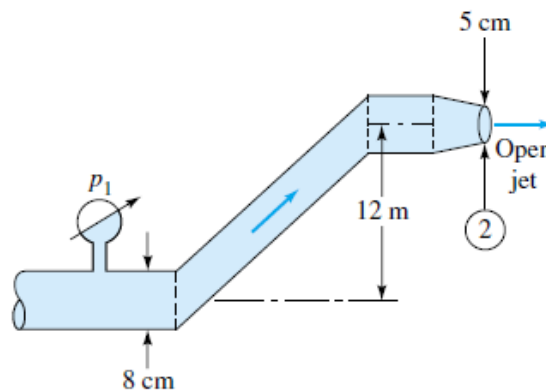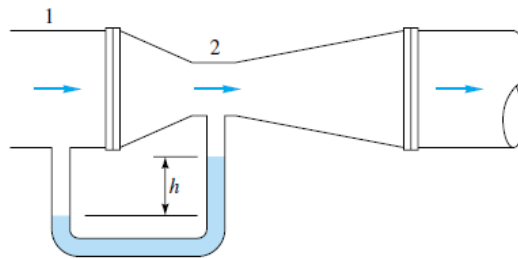


P3.167

**P3.165** A *venturi meter*, shown in Fig. P3.165, is a carefully designed constriction whose pressure difference is a measure of the flow rate in a pipe. Using Bernoulli's equation for steady incompressible flow with no losses, show that the flow rate $Q$ is related to the manometer reading $h$ by
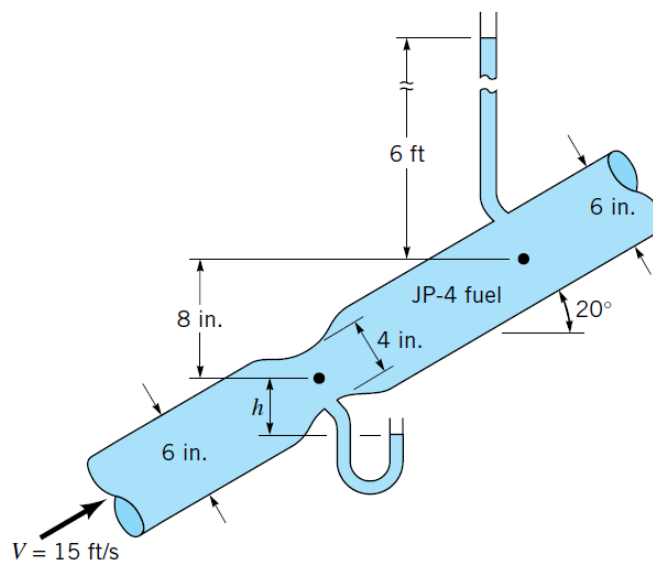
$$Q = \frac{A_2}{\sqrt{1 - (D_2/D_1)^4}} \sqrt{\frac{2gh(\rho_M - \rho)}{\rho}}$$

where $\rho_M$ is the density of the manometer fluid.



**P3.165**

**3.68**     JP-4 fuel $(SG = 0.77)$ flows through the Venturi meter shown in Fig. P3.68 with a velocity of 15 ft/s in the 6-in. pipe. If viscous effects are negligible, determine the elevation, $h$, of the fuel in the open tube connected to the throat of the Venturi meter.
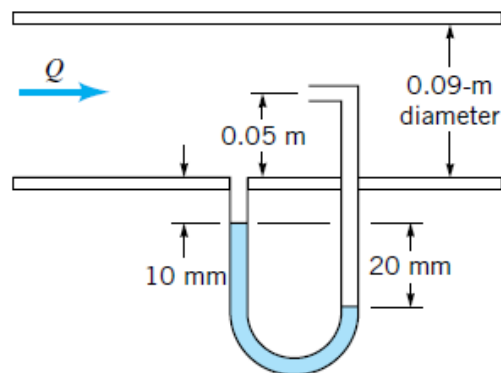


■ **FIGURE P3.68**

**3.66**    Determine the manometer reading, $h$, for the flow shown in Fig. P3.66.
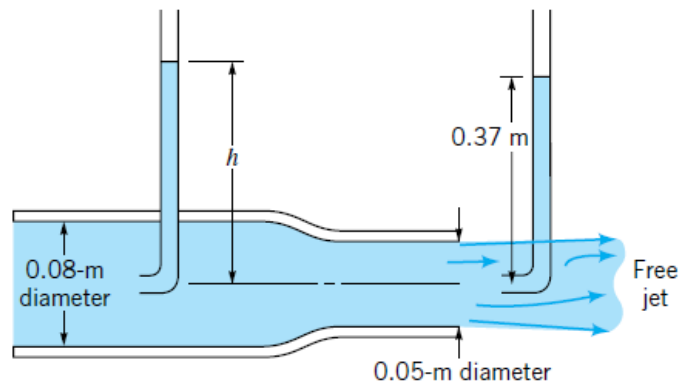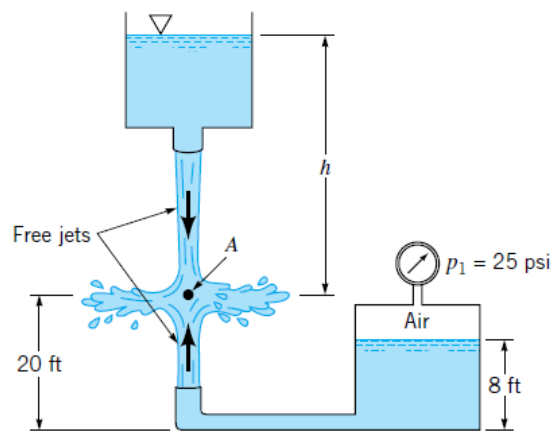


■ FIGURE P3.66

**3.67**    The specific gravity of the manometer fluid shown in Fig. P3.67 is 1.07. Determine the volume flowrate, $Q$, if the flow is inviscid and incompressible and the flowing fluid is **(a)** water, **(b)** gasoline, or **(c)** air at standard conditions.
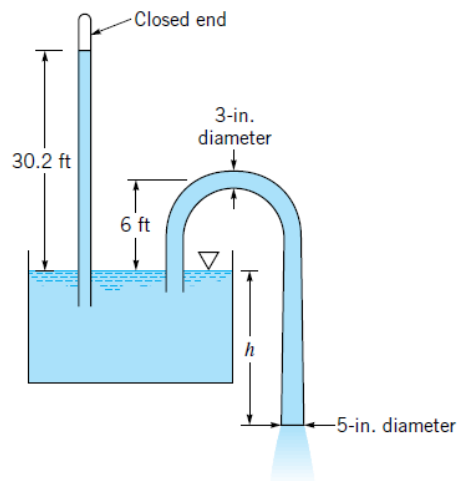


■ FIGURE P3.67

**3.34**    Streams of water from two tanks impinge upon each other as shown in Fig. P3.34. If viscous effects are negligible and point A is a stagnation point, determine the height $h$.



■ FIGURE P3.34

**3.39**    Water is siphoned from the tank shown in Fig. P3.39. The water barometer indicates a reading of 30.2 ft. Determine the maximum value of $h$ allowed without cavitation occurring. Note that the pressure of the vapor in the closed end of the barometer equals the vapor pressure.



■ FIGURE P3.39