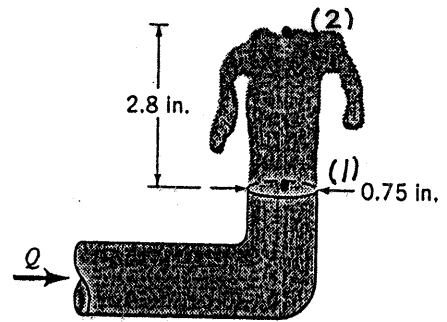3.19 Water flowing from the 0.75-in.-diameter outlet shown in Video V8.6 and Fig. P3.19 rises 2.8 inches above the outlet. Determine the flowrate.

■ FIGURE P3.19

The flowrate is $Q = A_1 V_1$, where from the Bernoulli equation

$$\frac{p_1}{\gamma} + \frac{V_1^2}{2g} + z_1 = \frac{p_2}{\gamma} + \frac{V_2^2}{2g} + z_2$$

Thus, with $p_1 = p_2 = z_1 = V_2 = 0$ we obtain

$$V_1 = \sqrt{2g \, z_2} = \sqrt{2(32.2 \text{ ft/s}^2)(2.8/12)\text{ft}} = 3.88 \text{ ft/s}$$

so that

$$Q = A_1 V_1 = \frac{\pi}{4}\left(\frac{0.75}{12}\text{ft}\right)^2 (3.88 \frac{\text{ft}}{\text{s}}) = \underline{\underline{0.0119 \frac{\text{ft}^3}{\text{s}}}}$$