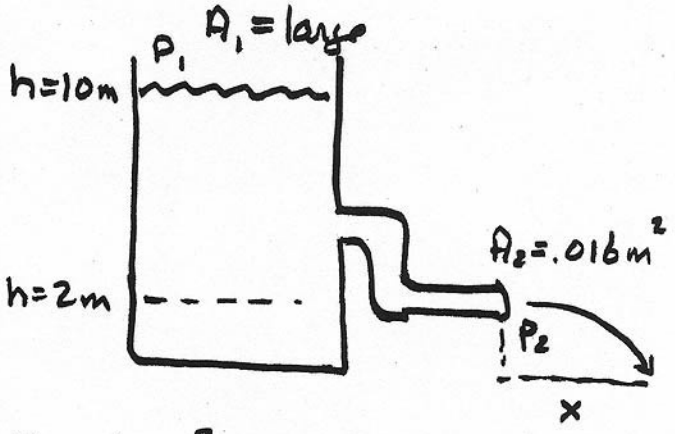
DAY 2 - Problem 2

How far does fluid flow from orifice?

Note: piping superfluous



Bernoulli's Equation $P + \frac{1}{2}\rho v^2 + \rho g y = \text{constant}$

Note: $P_1 = P_2 = P_{ATM}$

$\Rightarrow \rho g (y_1 - y_2) = \frac{1}{2}\rho (v_2^2 - v_1^2)$

ρ cancels $\Rightarrow$ independent of density

Since $A_1 \gg A_2 \Rightarrow v_2 \gg v_1 \simeq 0$

$\Rightarrow v_2^2 = 2g(y_1 - y_2)$ Torricelli's Theorem

Now, stream exits horizontally

time to fall 2m from rest $2 = \frac{1}{2} g t^2 \Rightarrow t = \frac{2}{\sqrt{g}}$

$$X = v_2 t = \sqrt{2g(y_1 - y_2)}\,\frac{2}{\sqrt{g}} = \sqrt{8(y_1 - y_2)}$$

$$= \sqrt{8 \cdot 8} = 8 \text{ m}$$

Independent of A_2 so long as $A_1 \gg A_2$