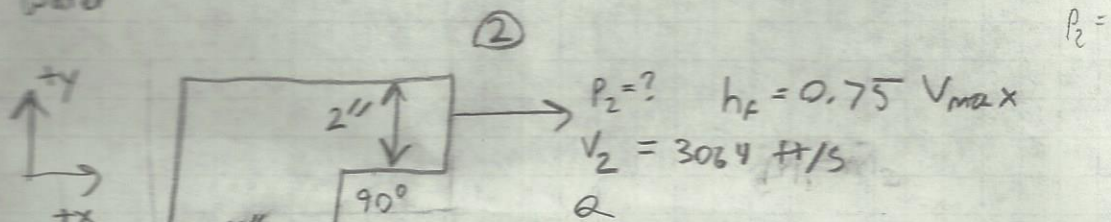


# HW 2

water



$$P_2 = ? \quad h_f = 0.75 V_{max}$$

$$V_2 = 3064 \text{ ft/s}$$

$$\textcircled{1} \quad \uparrow \quad 40 \text{ psig}$$

$$500 \text{ gal/min} = Q$$

$$V_1 = 766 \text{ ft/s}$$

$$500 \frac{\text{gal}}{\text{min}} \times 0.1337 \frac{\text{ft}^3}{\text{gal}}$$

$$= 66.85 \frac{\text{ft}^3}{\text{min}}$$

$$Q = A_1 V_1 \quad Q = A_2 V_2$$

$$66.85 \frac{\text{ft}^3}{\text{min}} = \frac{\pi \left( \frac{2 \text{ in}}{12} \right)^2}{4} V_2$$

$$V_2 = 3064 \text{ ft/s}$$

$$40 \text{ psi} \times 144 \frac{\text{in}^2}{\text{ft}^2} = 5760 \frac{\text{lb}_f}{\text{ft}^2}$$

$$A_1 = \frac{\pi \left( \frac{4}{12} \right)^2}{4} = 8.73 \times 10^{-2} \text{ ft}^2$$

$$\sum F_y = P_1 A_1 + \rho A_1 V_1^2 + F_w - F_g = 0$$

$$\sum F_y = 5760 \frac{\text{lb}_f}{\text{ft}^2} (8.73 \times 10^{-2} \text{ ft}^2) + \left( 62.4 \frac{\text{lb}_m}{\text{ft}^3} \right) (8.73 \times 10^{-2} \text{ ft}^2) \left( 766 \frac{\text{ft}}{\text{s}} \right)^2$$

$$+ 0.75 (766) \text{ lb}_f - \left( 62.4 \frac{\text{lb}_m}{\text{ft}^3} \right) V = 0$$

$$\sum F_x = -P_2 A_2 - \rho A_2 V_2^2 + F_w = 0$$