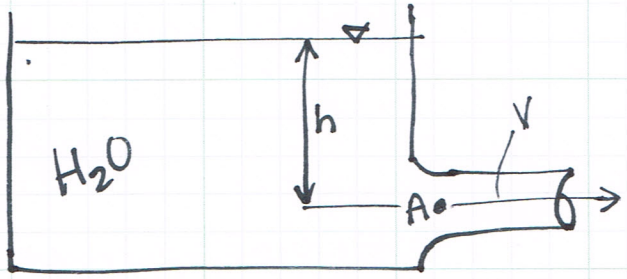
4.86) The velocity in the outlet pipe from this reservoir is 30ft/s and h=18ft. Because of the rounded entrance to the pipe, the flow is assumed to be irrotational. Under these conditions what is the pressure at A?

SKETCH:



KNOWN:

h=18ft
V=30ft/s
$\gamma_w = 62.4\ lb/ft^3$

UNKNOWN:

Pressure @ Point A

GOVERNING EQN:

$$\frac{P_1}{\gamma} + \frac{V_1^2}{2g} + z_1 = \frac{P_A}{\gamma} + \frac{V_A^2}{2g} + z_A$$

SOLUTION:

$$\frac{P_1}{\gamma}^{0} + \frac{V_1^2}{2g} + z_1 = \frac{P_A}{\gamma} + \frac{V_A^2}{2g} + z_A^{0}$$

$V_1 = 0$

$$0 + 0 + z_1 = \frac{P_A}{\gamma} + \frac{V_A^2}{2g}$$

$$P_A = \left(z_1 - \frac{V_A^2}{2g}\right)\gamma = \left(18ft - \frac{(30ft/s)^2}{2(32.2\ ft/s^2)}\right) 62.4\ lb/ft^3 = 251\ psf_g$$

$$P_A = 251\ psf * \frac{ft^2}{144\ in^2} = \boxed{1.74\ psi_g = P_A}$$