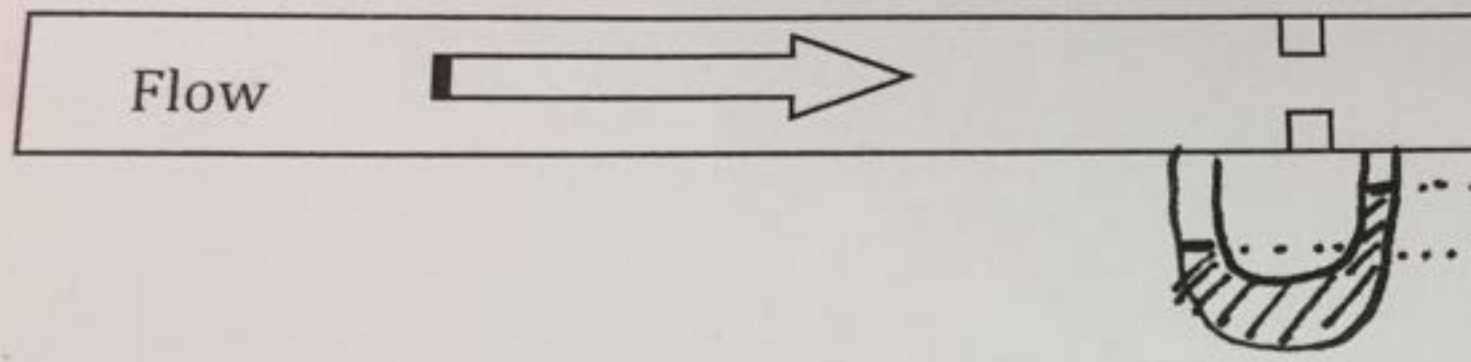
1) (10 points) A water manometer is used to measu
constriction in a pipe as illustrated below. What
square inch?



2) *(10 points)* For a flowing fluid, going from a
in class, under what conditions would the
larger pipe to the smaller pipe?

3) (25 points) A hollow concrete sphere is made
that are 0.5 inches thick. If it does not leak, what is
water? (The density of concrete is 144 lbm/ft^3). Ig

4) (30 points) The equation for flow in a circular pipe "power-law" fluid, is given by the following equation

$$v = \left(\frac{\Delta P}{2mL}\right)^{1/n} \left(\frac{n}{n+1}\right)\left[R^{\frac{n+1}{n}} -\right.$$

Where m and n are constants of the fluid, and ΔP/L i length (or pressure drop per unit length) and R is th value of n that causes this expression to become sim for the velocity profile in a pipe? What is v_{max} in thi Use this expression for a power law fluid to determi

5) (25 points) A typical hot air balloon has a volu
ambient air temperature is 60F, the burners o
balloon up to about 200F. What is the total m
Please give your answer in kg. You can assum
these conditions.