Fluid Mechanics: Assignment 3

Due date: October 23, 2018

1. (a) Consider an inverted cone with an orifice at bottom of area, $\mathbf{A}$, central half-angle α, and radius, $\mathbf{r}$ at the top. Use unsteady Bernoulli's form to get the expression for rate of velocity of drain at the orifice.
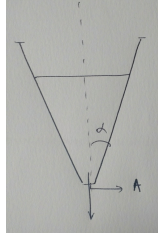

Figure 1:

   (b) Consider the two tanks of same volume, $\mathbf{V}$ shaped differently as shown in the figure 2, each with an orifice at the bottom with same area, A_o. Assume circular cross-section for both the tanks. Show which of the two drains faster than the other.
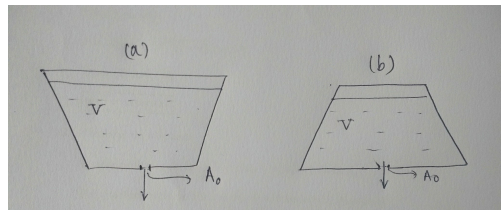

Figure 2:

2. Derive the relationship between cross-sectional radius and height of the stream of water that flows from a tap under gravity.

3. Derive the velocity profile for flow in a cylindrical pipe (assume axisymmetry about the longitudinal axis)

4. Obtain Blasius profile to get a similarity solution form for **one** of the following - a plane jet, a plane wake, round jet.