Winter 2025, PHY7B Practice Questions for OH1 *TA: Artyom Lisitsyn, alisitsyn@ucdavis.edu*

Question 1 'What the faucet?'

A faucet for water is turned on, where the opening for the water is a circle 2 cm across. The water comes out with a speed of 1 m/s, and then falls 15 cm into the bottom of the sink. Assume that the cross-section of the stream of water is a circle for all heights.

1. How fast is the water moving when it hits the bottom of the sink?
2. What is the final width of the stream when it hits the bottom of the sink?
3. How does the final width change if you quadruple the initial width of the stream? (i.e. 8 cm instead of 2 cm)
4. How does the final width change if you quadruple the height the water falls? (i.e. 60 cm instead of 15 cm)

Question 2 'Rough but steady'

A vertical pipe is designed to have a *constant pressure* and *constant width* throughout. Unfortunately the change in gravitational energy density may cause the pipe to have an increasing pressure near the bottom.

1. Explain how adding resistance to the pipe may resolve the issue.
2. Suppose the resistance for a section of the pipe of length ℓ is $R = \tilde{R}\ell$. In terms of $\tilde{R}$ (resistance per unit length), ρ (fluid mass density), and g (gravitational acceleration), determine the flow in the pipe necessary to have a constant pressure. Verify the units match.