Homework 3 - Bernoulli’s Equation
Questions 3.8, 3.16, 3.32, 3.48, 3.58 and 3.78

Q0) Pick a song that you like with a lyric that can be related to fluid mechanics and write down artist, song and lyric...

Q1 - 3.8) The Bernoulli equation is valid for steady, inviscid, incompressible flows with constant acceleration of gravity. Consider flow on a planet where acceleration of gravity varies with height such that \( g = g_0 - cz \) where \( g_0 \) and \( c \) are constants. Integrate \( F = ma \) along a streamline to obtain the equivalent of the Bernoulli equation for this flow.

Q2 - 3.16) A person holds her hand out of an open car window while the car drive through still air at 65mph. Under standard atmospheric conditions, what is the maximum pressure on her hand? What would be the maximum pressure is the car were an Indy 500 racer travelling 200mph?

Q3 - 3.32) An inviscid, incompressible liquid flows steadily from a large pressurized tank shown in the figure 3.32. The velocity at the exit is 40 ft/s. Determine the specific gravity of the liquid in the tank.

Q4 - 3.48) A 50 mm diameter plastic tube is used to siphon water from the large tank shown in figure 3.48. If the pressure on the outside of the tube is more than 30kPA greater than the pressure in the tube, the tube will collapse and the siphon will stop. If viscous effects are negligible, determine the minimum value of \( h \) allowed with the siphoning stopping.
Q5 - 3.58) If viscous effects are neglected and the tank is large determine the flowrate from the tank shown in figure 3.58

Q6 - 3.78) Determine the flowrate through the Venturi meter shown in figure 3.78 if ideal conditions exist.