Homework 3 – Bernoulli's Equation
Questions 3.8, 3.16, 3.32, 3.48, 3.58 and 3.78

Q1) Write a half to one page summary of the NSF fluid mechanics video you watched when in person class was canceled.

Q2 - 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.

Q3 - 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?

Q4 -3.32) An inviscid, incompressible liquid flows steadily from the 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.

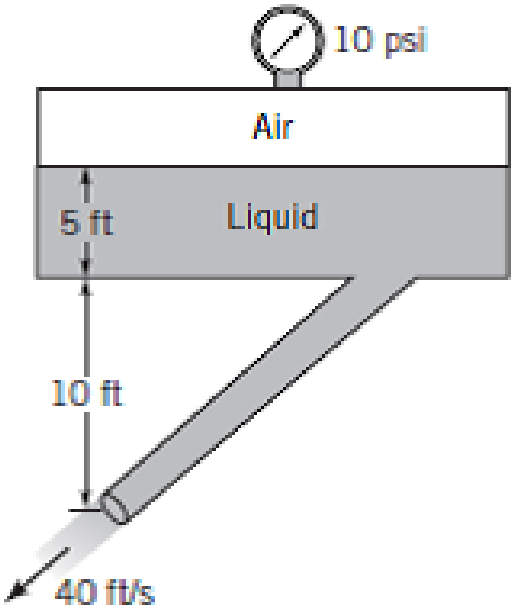

FIGURE P3.32

Q5 -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.

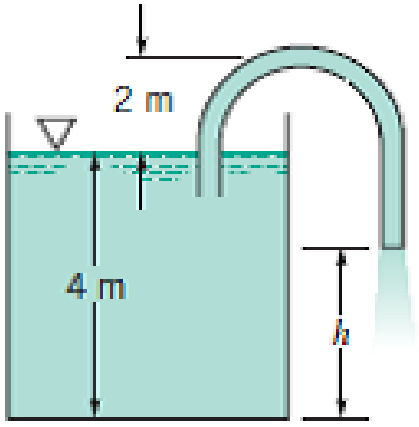

FIGURE P3.48

Q6 - 3.58) If viscous effects are neglected and the tank is large determine the flowrate from the tank shown in figure 3.58

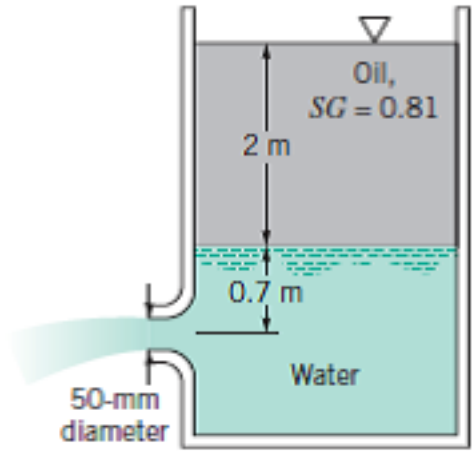

FIGURE P3.58

Q7 -3.78) Determine the flowrate through the Venturi meter shown in figure 3.78 if ideal conditions exist.

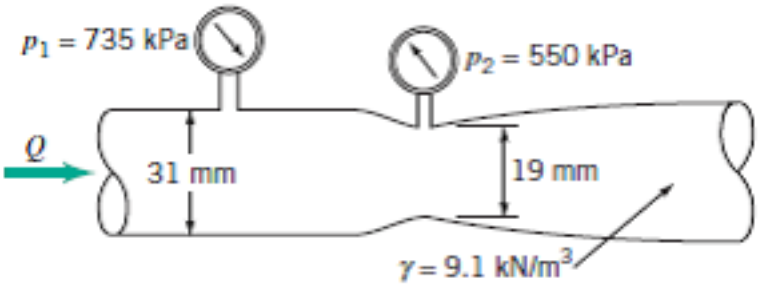

FIGURE P3.78