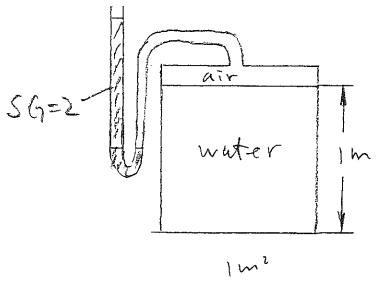
ME3080 Fluid Mechanics
Midterm, Summer 2018

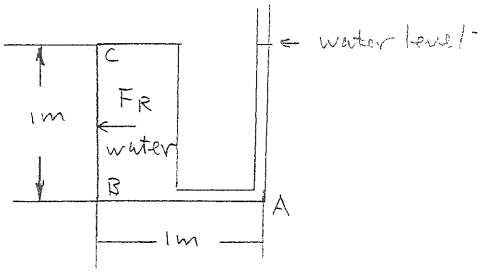
I have neither given nor received any help on this exam. Signature_____

Name_____
(print)

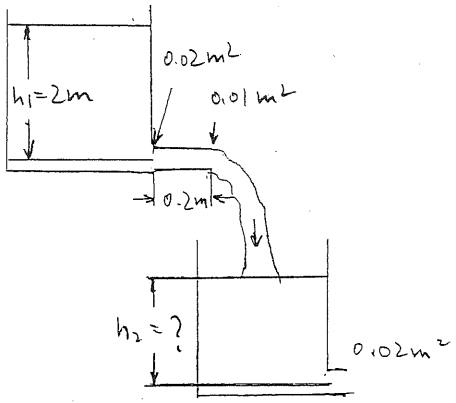
1. A water tank is connected to a manometer with a fluid having a specific gravity of 2.0. The depth of the water in the tank is 1 m and the area of the bottom is 1 m^2. Determine 1) the pressure at the top of the tank, and 2) the pressure force on the bottom of the tank. Use gage, not absolute pressure. (25 points).



2. A water tank connected to a tube is being accelerated at 9.8 m/s^2 in the horizontal direction. The end of the tube is open to the atmosphere. Determine 1) the pressure at points A, B, and C; 2) the resulting pressure force on the left side wall and its location. (25 points)



3. Water from a large tank flows into a second tank through a pipe with an inlet area and an exit area of 0.02 m^2 and 0.01 m^2 respectively and a length of 0.2m. The opening at bottom of the second tank has an area of 0.02 m^2. A) Determine the water level in the second tank to keep the level constant; b) Assuming that the velocity varies linearly in the exit pipe of the first tank, determine the acceleration of the flow at the exit of the pipe. (25 points)



4. A water pipe with an elbow is shown in the figure. The entrance is connected to another pipe with flanges. The inlet and exit areas are 0.02 m^2 and 0.01 m^2 respectively. The inlet (gage) pressure is 10^5 Pa. The horizontal anchoring force of the flange is 7000N. Determine: (a) The vertical anchoring force. b) The volume flow rate. (25 points)