Chapter 12 Written Homework Problems
DUE: May 3rd at 7:30 PM
SHOW ALL WORK FOR FULL CREDIT

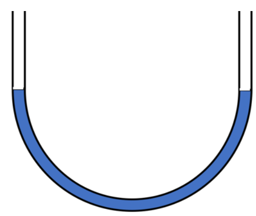
1. What is the pressure in Pascals and pounds/square inch at 200 meters below the surface of the ocean (you might want to look up the average specific gravity of ocean water) and 10 miles above the surface of the earth using the equation we derived in class for pressure versus altitude?

2. In class we assumed an isothermal (constant temperature) atmosphere throughout the troposphere when we calculated the change in atmospheric pressure with altitude. A good approximation to the variation of the temperature with altitude is

$$T = T_E - \beta y,$$

where T_E is the temperature of the Earth at its surface and $\beta = 6\ ^{o}\text{C/km}$ and is constant. *(a)* Using the assumptions we made in class, yet now accounting for the variation in temperature with altitude, what is the variation of pressure with altitude in terms of the altitude, y, the average molecular mass of M, and the temperature T with appropriate constants. (*b*) Given this more accurate pressure profile, what is the pressure and temperature at the cruising altitude of a commercial jet, say 35,000 ft? Assume T_E = 293 K. *(c)* How do your answers in *(b)* compare with the answers obtained assuming an isothermal atmosphere?

3. A glass tube is filled with water as shown. A plunger is inserted to one on the vertical tubes and the water is displaced slightly into the other vertical tube. The plunger is removed, after which the water level oscillates. In terms of g and L (the total length of the water in the tube), what is the period of this oscillation assuming no damping forces are present?



4. A siphon is shown on the right, the tube having a constant cross-sectional area is filled with the liquid in the container, then on end of the tube is lowered to below the bottom of the container so as to drain the liquid from the container. The container is open to atmospheric pressure, P_o. How large can h_1 be if water flow is still to occur?