HW#11: PRESSURE

1. The deepest point in the Pacific Ocean is the Mariana Trench, about 11 km deep. The pressure at the ocean floor is huge, ~ 1.13×10^8 N/m^2.
a. Calculate the change in Volume of 1.00 m^3 of water carried from the surface to the bottom of the Pacific. ($B_{water} = 0.210 \times 10^{10}$ Pa) [-0.05376 m^3]
b. The density of water at the surface is 1.03×10^3 kg/m^3. Determine its density at the bottom. [1089 kg/m^3]
c. Is it a good approximation to think of water as **incompressible**?

2. On the Food Network one of the Thanksgiving episodes showed how to make gravy. The host poured the drippings from the roasted turkey into a cylindrical container, where the gelatin (density = .92 g/cm^3) separated from the fat (density = .68 g/cm^3). If there was 20 cm of gelatin and 10 cm of fat, determine the pressure at:
a. the top of the cylinder. [atmospheric pressure]
b. between the fat and the gelatin. [1.020×10^5 Pa]
c. at the bottom of the gelatin. [1.038×10^5 Pa]

3. When you suddenly stand up after lying down for a while, your body may not compensate quickly enough for the pressure changes, and dizziness may result. If the gauge pressure of blood (density = 1.06 g/cm^3)at your heart is 13.3 kPa and your body does not compensate:
a. Determine the pressure at the top of your head (~50 cm above your heart) [8.1×10^3 Pa]
a. Determine the pressure at feet (~130 cm below your heart) [2.6804×10^4 Pa]

4. A Mercury based barometer will show normal atmospheric pressure at ~76 cm. Blaise Pascal constructed a barometer based on red wine (density = .984 g/cm^3). At what height of red wine will atmospheric be measured? [10.5 m]