 Name: Due Date

Assignment 1.01: Density

1. You are thinking about buying a water bed to use in your second-floor bedroom. The dimensions of the water bed are 1.83 m x 2.13 m x 0.229 m. The floor can tolerate a weight of no more than 6660 N. Find the weight of the water in the bed, and determine if you should purchase this bed.

2. The United States Nickle has remained largely unchanged from 1938 to the present (with the exception of the 2004 and 2005 commemorative nickles), whereas pennies have been made from bronze, brass, aluminum, steel and copper-plated zinc. Explain why some someone would want to use a nickle to test if a scale is accurate and not a penny.

3. The Georgia state capital is covered in gold leaf (gold that has been pounded into a thin sheet), with a thickness of 3×10^{-7} m. The dome is a half-sphere with a diameter of 22.86 meters. Find the mass of the gold that covers the dome. The density of gold is 19320 kg/m^3.

4. The sun has a radius of 6.96×10^8 m, and a mass of 1.998×10^{30} kg. Saturn has a radius of 6×10^7 m, and a mass of 5.7×10^{26} kg. Imaging that there were an enormous ocean, capable of holding the Sun and Saturn at the same time.

   (a) Would the sun float or sink? Justify your answer.

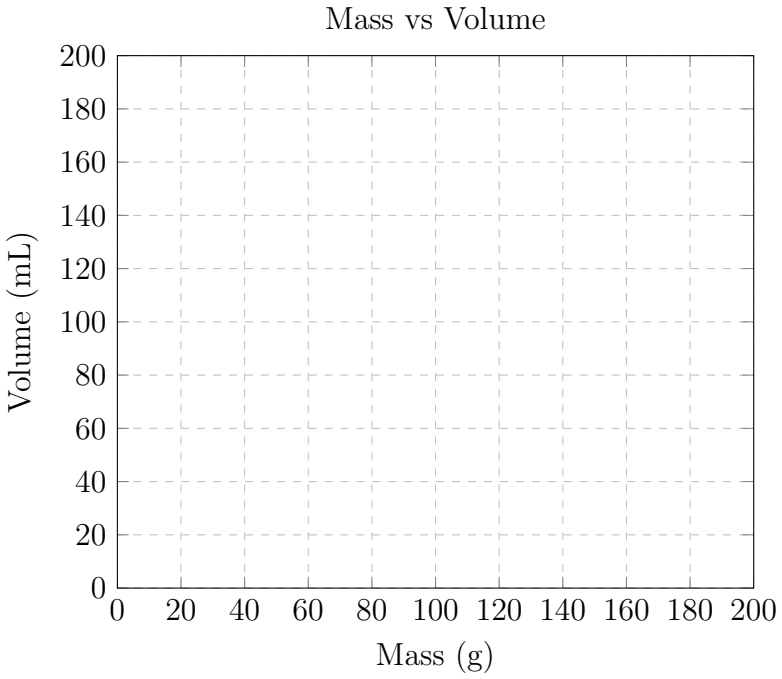
   (b) Would Saturn float or sink? Justify your answer.

5. You are given a sample of and unknown fluid and are asked to determine the fluid the sample is made of. You are given the following information:

Substance	Density (kg/m^3)
Gasoline	711
Extra Virgin Olive Oil	785.1
Water	1000
Whole Milk	1020
Ethelyne Glycol	1120
Sodium Hydroxide	1250

You collect the information in the table below:

Volume (mL)	Mass (g)
20	50.702
40	66.404
60	82.106
80	97.808
100	113.51
120	129.212
140	144.914
160	160.616
180	176.318
200	192.02



(a) On the graph to the right, plot the data you have collected. Draw a best fit line and determine the slope of the line.

(b) Use the slope of the line to determine the density of the fluid, and determine which fluid is most likely present in the sample.

(c) Briefly explain what physical quantity the y-intercept of the graph represents.