Assignment 5

Math 1030

Due Friday, September 28th

Name: _____

1. **Percentage Calculations**

   (a) (Modification of question 6 from section 3A of the textbook.)
   Your receipt shows that you paid 47.96 for a new shirt, including sales tax. The sales tax rate is 9%. How much did you pay in sales tax?

   (b) (Modification of question 8 from section 3A of the textbook.)
   A friend has a textbook that originally cost 150. The friend says that you can have it for 100% less than he paid for it. Your price will be:

(c) (Question 97 from section 3A of the textbook.)

Your property taxes increase 6% in one year and increase 7% the next year. The total increase in taxes over the two years is 13%. Is this correct or incorrect? If incorrect, what is the actual percentage increase in the two years?

(d) (Question 92 from section 3A of the textbook.)

Your dinner bill is $\$42.50$. You leave $\$50$. What percent tip did you leave?

(e) (Question 81 from section 3A of the textbook.)

Express this change in terms of absolute change in terms of percentage points, and as a relative change in terms of percentage: Between 1960 and 2010, the percentage of the U.S. population composed of people over 65 increased from 9.2% to 13.2%.

2. **Putting Numbers in Perspective**

   (Question 82 from section 3B of the textbook.)

   A few billion years from now, after exhausting its nuclear engines, the Sun will become a type of remnant star called a *white dwarf*. It will still have nearly the same mass (about $2 \times 10^{30} kg$) as the Sun today, but its radius will be only about that of the Earth (about 6500 km).

   Note - Write all your answers in scientific notation.

   (a) Calculate the average density of the white dwarf in units of kilograms per cubic centimeter.

   (b) What is the mass of a teaspoon of material from the white dwarf? (Hint: A teaspoon is about 4 cubic centimeters.) Compare this mass to the mass of something familiar (for example: a person, a car, a tank.)

(c) A neutron star is a type of stellar remnant compressed to even greater densities that a white dwarf. Suppose that a neutron star has a mass 1.4 times the mass of the Sun but a radius of only 10 kilometers. What is its density? Compare the mass of 1 cubic centimeter of neutron star material to the total mass of Mt. Everest (about $5 \times 10^{10} kg$).

3. **Significant Figures and Rounding Rules**

   Use the appropriate rounding rules to answer these questions with the correct precision or correct number of significant digits.

   (a) (Question 70 from section 3C of the textbook).
       Add the times 2 hours, 37 minutes and 1 hour, 22 minutes, 15 seconds.

   (b) (Question 72 from section 3C of the textbook).
       Divide the distance 110 kilometers by the time 55 minutes.

   (c) (Question 74 from section 3C of the textbook).
       At the hardware store, you buy a 50-kilogram bag of sand. You also buy 1.25 kilograms of nails. What is the total weight of your purchases?

4. **Consumer Price Index**

   (Question 46 from section 3D of the textbook.)

   The typical (median) price of a single-family home in the West (United States) rose from $129,600$ in 1990 to $241,300$ in 2005. Calculate the relative change in price from 1990 to 2004, and compare it to the overall rate of inflation as measured by the Consumer Price Index.