MATH1030-007

NAME:

Quiz 4

February 8, 2013

Instructions: Do all the problems on **both sides** of this paper. Show all your work.

1. **[5 points]** Complete the following table of conversion factors.

$$1 \text{ inch} = \underline{2.54} \text{ cm} \qquad 1 \text{ mile} = \underline{1.60} \text{ km}$$

$$1 \text{ lb} = \underline{\tfrac{1}{2.2}} \text{ kg} \qquad 1 \text{ gal} = \underline{3.785} \text{ Liters}$$

$$1\ \mu\text{ g} = \underline{10^{-6}} \text{ g}$$

2. **[5 points]** According to a 2011 survey, 90% of the population of Kansas smokes cigarettes, up 50% from the previous year. What percentage of the population of Kansas smoked in 2010?
Be sure to read problems like this one carefully. We are given that 90% of the population smokes now, and this is a 50% increase from the year before. The increase is not 50 percentage points. The problem is saying that if S is the percentage of the population that smoked in 2010, then the precentage that smokes now is 50% more than S or $1.5 \times S$. So $90\% = 1.5S$ and we can conclude that $S = 60\%$.

3. **[5 points]** A 2009 Pew Research Center study found the average American owns 75 pairs of pants. A similar study found that in 1990 the average American owned 53 pairs of pants. Find the absolute and relative change.
The absolute change is the difference between the new value and the reference value, so

$$\text{abs.change} = \text{newvalue} - \text{ref.value} = 75 - 53$$

The relative change is the absolute change as a fraction of the reference value, so it is given by

$$\text{rel.change} = \frac{\text{abs.change}}{\text{ref.value}} = \frac{22}{53} = 41\%$$

4. **[5 points] True of False.** Your property taxes increased 10% last year and increase 10% again this year. The total increase in taxes over the two year period is 20%. Explain your answer. If it is false, state the true change as a percentage.
False. If we denote the property taxes two years ago by T, then last years' taxes are 10% more than T or $1.10 \times T$. This years' taxes are then 10% more than last years' taxes, or

$$1.10 \times (\text{lastyears}'\text{taxes}) = 1.10 \times 1.10 \times T = 1.21 \times T$$

So this years' taxes are 121% of the initial taxes, or 21% more.