Chemistry 236 -- Quiz 1  
September 16, 2009 — Statistics and KaleidaGraph Basics

**Pledge and signature:**

**Note:** If you want your paper returned folded (i.e., score concealed), please print your name on the back.

1. (2) Consider the number 41. If this represents a rounded experimental result, what are its absolute and percent uncertainties? ±0.5 1.22%

2. (3) A pressure is measured to be 654.15 Torr and is estimated to be uncertain by 0.35%. Using the 10% rule for uncertainties, state this pressure and its uncertainty. 654.2 ± 2.3 Torr

3. (5) Marge Inovera measures a quantity 43 times and obtains an average and a sum of squared residuals. If the latter is 789.155,
   a. Give Marge's estimated variance, standard deviation, and standard deviation in the mean. (Give precision commensurate with the provided information.)
      \[ s^2 = 18.7894 \quad s = 4.33467 \quad s_{\text{mean}} = 0.661032 \]
   b. Use the 10% rule to restate the latter two values. 4.3 and 0.7

4. (2) State the following quantities unambiguously to 5 significant figures:
   a. 12000071 1.2000×10^7  
   b. 66.122500 66.122

5. (6) An unweighted fit of 37 thermistor calibration correction values yields the results shown here.
   a. Calculate \( s_y^2 \) and \( s_y \). (Give at least four significant figures.)
      \[ 1.4678×10^{-5} \quad \& \quad 0.0038312 \]
   b. Suppose this were a weighted fit, but with the weights known in only a relative sense. Calculate the corrected values for the errors in \( a \) and \( b \). (Again, at least four significant figures.)
      (multiply Errors by \( s_y \))
      \[ s_a = 4.7778×10^{-6} \quad \& \quad s_b = 7.8058×10^{-7} \]
6. (5) A quantity $x$ is uncertain by 2.0% and $y$ is uncertain by 3.0%. Give the % uncertainties for $z$ in each of the following cases:

a. $z = 5/y$
   
   3.0%

b. $z = 11x^4$
   
   8.0%

c. $z = 1/\sqrt{3}y$
   
   1.5%

d. $z = 5x/y^2$
   
   (40)$^{1/2}$ %

e. $z = \sqrt[4]{4y}$
   
   2.5%

7. (4) A quantity $x$ is uncertain by 2 and $y$ is uncertain by 3. Give the uncertainties for $z$ in each of the following cases:

a. $z = 5 + y$
   
   3

b. $z = -9x$
   
   18

c. $z = 11 + 4x - 9y$
   
   28.2

d. $z = 15x + y^2$ [Take $y = 7$.]
   
   51.6