Analytical Chemistry
Problem Set 2
Due Monday, February 9, 2009 (at 4:00 p.m.)
Total possible points for this assignment = 38

For the statistics problems from Chapter 4, you are not expected to calculate means and standard deviations by hand, nor write out these calculations—feel free to use the functions built into your calculator. However, you should write out your calculation of confidence intervals.

1. (6 points) Harris 3-11. Two caveats: (1) You must justify (with a brief discussion) your answers. You will receive no credit for this problem if you simply write down the answers in the back of the book. (2) Contrary to Harris, I would assert that there is some random error in this measurement as well. Briefly explain my assertion.

2. (11 points) Harris 4-4. Report all answers to four decimal places. Also, for part (c), write down the Excel formula(s), including the numerical values for the arguments, that you use to solve the problem.

3. (5 points) Harris 4-17

4. (6 points) Harris 4-19. Use Excel's TINV function to compute accurate values for Student's *t* with the appropriate number of degrees of freedom.

   The Excel syntax is `TINV(1-confidence level written as a decimal,number of degrees of freedom)`. So, for example, if you had two data sets consisting of 36 total measurements, and wanted Student's *t* at the 95% confidence level, you would type into an Excel cell

   `=TINV(0.05,34)`

   since 1-0.95 = 0.05 and there are 36-2 = 34 degrees of freedom.

5. (10 points) (From the 1994 American Chemical Society examination in Analytical Chemistry)

   When the *t*-test reveals no significant difference between an experimental mean value and the accepted value at the 95% confidence level,

   (a) no significant systematic error is likely to be present.
   (b) random error is not likely to be present.
   (c) the random error is likely to be less than the systematic error.
   (d) a different confidence level must be used.

   Choose the best answer and explain why your choice is right, and other three choices are wrong.