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CHE 226 —Analytical Chemistry
Exam I
February 12, 2004

Answer the following questions in the space provided. **Use pencil only**. Do not scribble over unwanted answers; erase carefully. **Show all work.** If you show only the numerical answer, and the answer is not exactly right, **you get no partial credit.** Correct set-up of problems gets 80-90% credit regardless of whether the arithmetic is correct. **Circle final numerical answers.**

1. (15 points) Estimate the absolute standard deviation of the result of the following calculation. Round the value of *y* result so that it contains only significant digits.

$$y = \frac{10.31(\pm 0.02) + 5.92(\pm 0.09)}{3.678(\pm 0.007)} = 4.412724306688$$

2. (15 points) A lab tech determines the percent chloride in a sample to be 39.78 %.

   a) If this value is the mean of three measurements and the standard deviation of the determination is 0.091 % chloride, what is the standard deviation of the mean?

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b) Explain the difference between the standard deviation and the standard deviation of the mean.

3. (15 points) Apply the Q test to the following set of data to determine whether the outlying result should be retained or rejected at the 90% level. Look carefully at the data.

# observations	3	4	5	6
$Q_{crit(90\%)}$	0.941	0.765	0.642	0.560

Data: 41.27 41.61 41.84 41.70

4. (15 points) A student calibrates a nominal 50-mL flask and finds its mean volume to be 49.986713158 with a standard deviation of 0.047983745 mL ($N = 3$). Calculate the 95%

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confidence limits for the volume of the flask. The digits in the numbers were copied directly from the readout of the student's calculator, so you must decide the proper number of significant figures in the confidence limits.

5. (20 points) List four Excel functions, and explain their arguments. For example, =LOG(A1) gives the logarithm of the number in cell A1.

a)

b)

c)

d)

6. (20 points) Define, explain, or otherwise describe the following. Formulas are fine, but they're not enough.

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