1. Altitude measurements using the Global Positioning Satellite (GPS) system have been greatly improved with the implementation of the Wide Area Augmentation System (WAAS) that occurred on July 10\textsuperscript{th} of this year. Measurements of altitude from a GPS receiver with WAAS were 1005.3 ft, 1004.7 ft, 1005.9 ft, and 1002.2 ft.

Can any of the points be rejected at the 90\% confidence interval? If so, which one(s)?

For all remaining points calculate the mean, the standard deviation, the relative standard deviation in ppt, and the confidence interval for $\mu$ at the 90\% confidence interval.
2. A defendant is on trial for second degree burglary. In his possession were pieces of electronic equipment matching what was stolen from an apartment complex in Lawton; however, as the owners had not recorded any of the serial numbers there was not a definitive link to the crime. Lawton CSI did find shards of glass embedded in the defendant’s jacket, which he claimed came from some broken glassware in the CU Freshman lab. Because laboratory glassware is a special borosilicate glass, determination of the boron content in the glass from his coat and from the broken glass at the crime scene was accomplished. The glass (using 5 measurements) from the defendant’s coat had a boron content of 15.4 ppm, while glass from the crime scene (using 6 replicates) had a boron content of 14.0 ppm. The pooled standard deviation for the tests was found to be 0.8 ppm. Using the 99% confidence level, is there a significant difference in the two glass samples?
3. For the following calculations, determine the a) answer and b) the appropriate uncertainty for each result.

\[ 157(\pm 2) + 57.0(\pm 0.8) \]

\[ 18.6(\pm 0.3) / 94.5(\pm 0.5) \]

\[ [3.94(\pm 0.04) + 2.11(\pm 0.02)] / 0.652 (\pm 0.006) \]

\[ -\log [5.1(\pm 0.3) \times 10^{-8}] \]

\[ 15.8(\pm 0.4) + 7.3(\pm 0.3) - 23.1 (\pm 0.7) \]
4. a) The concentration of C\textsubscript{20}H\textsubscript{42} (FM = 282.55) in winter rainwater is 0.2 ppb. Assuming that the rainwater has a density of 1.00 g/mL, calculate the molar concentration of C\textsubscript{20}H\textsubscript{42}.

b) A bottle of concentrated sulfuric acid, labeled 98.0 wt% H\textsubscript{2}SO\textsubscript{4}, has a concentration of 18.0 M. Calculate the mL of reagent that should be diluted to 1.000 L to give a concentration of 1.00M H\textsubscript{2}SO\textsubscript{4}; and calculate the density of 98.0 wt% H\textsubscript{2}SO\textsubscript{4}.
5. Consider the dissociation of barium chromate \((\text{BaCrO}_4; \ K_{sp} = 2.1 \times 10^{10})\)

a) Calculate the molar solubility of \(\text{BaCrO}_4\) in water [HINT - assume \(\gamma_i = 1\) for all ions in this situation]

b) Calculate the concentration equilibrium constant for \(\text{BaCrO}_4\) in 0.050 M NaCl.

c) Calculate the molar solubility of \(\text{BaCrO}_4\) in 0.010 M NaCl.

d) Calculate the molar solubility of \(\text{BaCrO}_4\) in a solution of 0.00333 M \(\text{K}_2\text{CrO}_4\).

e) Calculate the percent relative error associated with the facile assumption that the activity would equal the concentration for part (c) of this problem. [HINT: Isn’t this the assumption that you used (properly) in part (a) of this problem?]