Whole class data (week 3)
1. Calculate the average and standard deviation of the weight percent of Cu in pennies by year using the whole class data. Calculate the weight percent of copper by year.
2. Deleted.
3. Plot the weight percent copper versus manufacture year for the whole class, Group 1, 2, and 3 data on <u>one</u> graph. Add error bars to the plot.
4. Calculate the average and standard deviation of the mass of Cu in the 1985 penny using the whole class data (question 1). Is the weight percent Cu statistically different from the reported 2.5% Cu in a modern penny at the 90% confidence interval?
5. deleted
6. deleted
7. Look at the tables in chapter 2 of the textbook. Compare the relative standard deviation of a 5 ml automatic pipet dispensing 2.5 ml with the relative standard deviation of an analytical balance weighing 2.5 g. Which method is more precise?

Lab write-up
1. **Purpose:** write a 1-sentence purpose for the entire lab.
2. **Results:** Briefly discuss your results, shown in figures and tables:
   a. Figure 1: Calibration curve (include error bars, line of best fit, and r-squared values)
   b. Figure 2: Mass of penny vs manufacturing year (include error bars and results from t-test)
   c. Figure 3: Mass of penny vs manufacturing year: whole class, Group 1, Group 2, and Group 3 (include error bars and results from t-test)

   d. Table 1: Mass pennies as a function of manufacture year (be sure to include errors)

sample	Mass penny (g)	[Cu2+] in solutions (ppm)	Mass Cu in penny (g)	Weight % Cu
1983				
1984				
1992				
Unknown(s)				

   e. Table 2: Standard deviations calculated from duplicate data

Source	St. dev.
Flame AA- instrument error	
Bench chemistry- dilution error	
Variation in mass of pennies	

f. Table 3: Results from whole class data (see website)

	Group 1		Group 2		Group 3		Whole Class	
Sample	Mass Cu in penny (g)	Weight % Cu	Mass Cu in penny (g)	Weight % Cu	Mass Cu in penny (g)	Weight % Cu	Mass Cu in penny (g)	Weight % Cu
1983								
1984								
1992								

a. Table 4: Summary of results from graphs of weight percent Cu vs manufacturing year. (see website)

Data set	Equation of line of best fit	r-squared	T-table	t-calc
Group 1				
Group 2			---	---
Group 3			---	---
Whole class				

a. Table 5: results from t-tests comparing the "true" weight percent copper with experimental results for the 1985 penny.

Calculation	t-test range
Your group	
Whole class	

3. **Discussion:** respond to the questions above in <u>paragraph form</u> (not Q1: answer). Devote 1-2 paragraphs to discuss each question from week 2 and 1-2 paragraphs for the whole class data.
4. **Conclusion:** Write a short paragraph concluding what you learned.
5. **Group dynamics:** let me know how you feel your group worked together.
6. **Appendix 1- Calculations:** You can send me your spreadsheet.