Make-Up Lab Assignment
CO_2 Graphing
CHEM 132L Expt. 7

Include the following information at the top of the first page of your assignment:
Your Name
Chemistry Lab Section Number
Experiment Title
Due Date

Directions: Complete this assignment and turn in a typed set of answers to all questions.

To complete this assignment your instructor will provide you with an Excel file called "CO_2 Data Make-up Assignment.xlsx". The data in the spreadsheet are monthly average CO_2 concentrations from the Mauna Loa Observatory in Hawaii. The first worksheet is the entire 55-year record of CO_2 data listed in two columns. One column represents the raw CO_2 monthly average concentration and the second column is a seasonally corrected value to normalize for drawdown of CO_2 during active plant photosynthesis in the northern hemisphere. The second worksheets represent the 8-year period from 1959-1966. On each worksheet there are two graphs. The first is a graph of the entire record represented in that worksheet. Both the raw and seasonally corrected data are plotted in the first graph. The second graph is a plot of just one year of data (the first year in each). For all the graphs, a linear trendline has been fitted to the seasonally corrected data and the equation of that line is shown. Follow the directions below and answer the questions for the time period 1959-1966.

<u>Data and Calculations</u>

1. Open the sheet for the 8-year period. Record the equation of the trendline in the one year graph (slope, intercept and R^2 value). Then replace the data in this plot with the next year and record the equation for the trendline. Plot each year from your assigned timeframe, and record the values from the equation for each year. Create a typed table that concisely presents the trendline data for all eight years.

2. Using the equation for each year, predict what the CO_2 concentration should on December 31,1967. Add all eight of these values to the table in question 1 above. Then, make the same prediction for the CO_2 concentration using the equation for the entire 8-year period. You should have nine predictions of the CO_2 concentration using the different time ranges. ***Note you will have to convert the date to a number to make this calculation by using the date converter (in bold at the top of the worksheet).

<u>Questions</u> – All answers should be typed and answered in complete sentences.

1. Why was the seasonally corrected data used for the one year plots instead of the raw CO_2 data? Specifically, how would using the raw data have affected the trend line?

2. Are the CO_2 concentration predictions based on the one-year time frames that you calculated above similar to each other?

3. How do the one-year models compare with the 8-year model? Explain.

4. Look up the actual CO_2 concentration on December 31,1967 at http://www.esrl.noaa.gov/gmd/ccgg/trends/and compare this with your predictions? Which model is the most accurate? Why?

5. Find the last CO_2 concentration in the 8-year data set and double the concentration value. Using your 8-year model, predict the <u>date</u> that the CO_2 concentration would reach this doubled value. Now make the same prediction using the model for the total 55-year record and compare the two predictions. Show your calculations for each prediction. You will need to convert the numeric date you calculate to a m/dd/yyyy format. To do this simply type the number you calculate into any blank cell in Excel. Then change the cell format from 'general' to 'date'. For example, 104582 is equal to May 2186.

6. Why are the predictions for the year the CO_2 concentration will double different from each other, and what does this tell you about making predictions using a model generated from existing data?