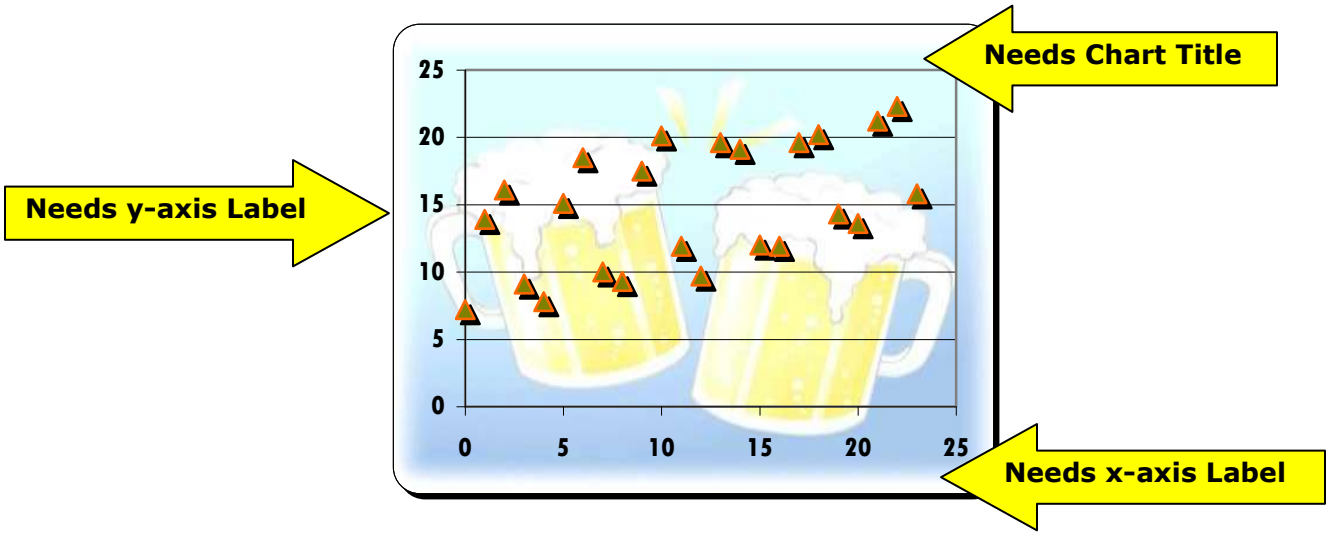
Deliverable #3 – Modeling Beer Sales DUE: Fri, 10/26 by 11:59PM

Milestone Outcome: To find and plot a function that models increasing periodic data

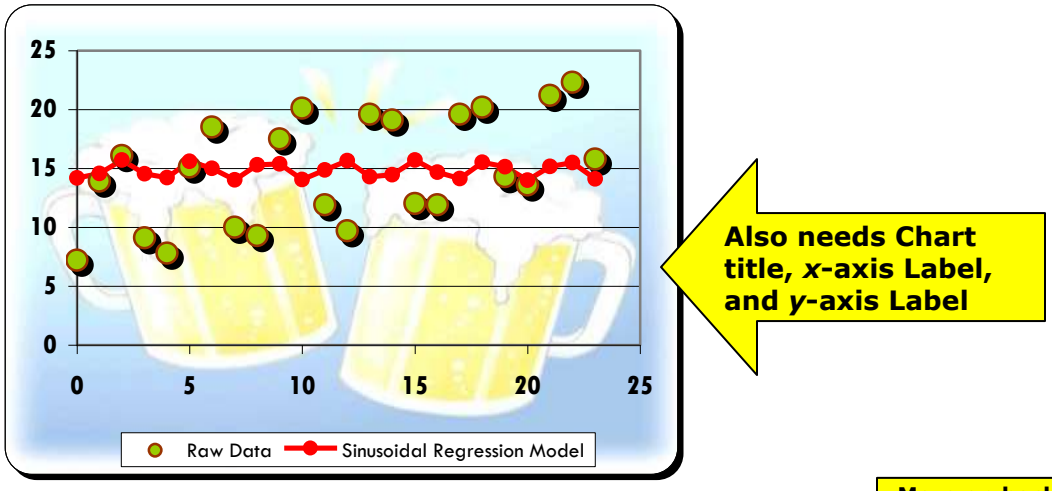
1. Download the data and create a scatterplot.

- Go to the class website and click on "Link to Beer Sales Data" to retrieve a dataset using your student ID.
- You can just **copy** and **paste** the data from the website into Excel.
- Using Excel, create and customize a scatterplot using the data. Give it a title and label the *x*- and *y*-axes appropriately (use the correct units).



2. Find a sinusoidal model.

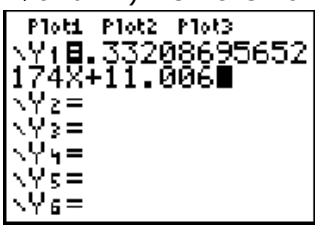
- Enter the data into your calculator following the yellow directions that went with Section 6.8.
- Find a sinusoidal regression model using **SinReg**.
- Copy the data from the website into another tab in the same Excel workbook.
- Using the technique from Deliverable #2, plot the sinusoidal regression function that you found from the calculator by entering the function in column C. When you enter the function, use ALL of the decimals to retain as much accuracy as possible. (Remember to reference column A for the *x*-values and use "*" for multiplication.)
- By highlighting all three columns, create a new chart. Customize and label the chart and have Excel smoothly follow the sinusoidal regression model with a line, as shown below. Do NOT connect the raw data points with a line.
- Modify the legend to say "Raw Data" and "Sinusoidal Regression Model" for the two series. (See part 3 of Deliverable #1 on how to do this.)



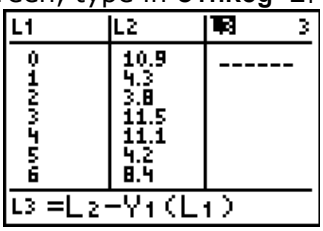
More on back

3. Get a better model.

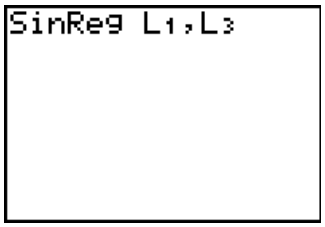
- As you can see from the graph in #2, the sinusoidal function does a poor job of modeling the data. This is because the midline is not constant, but increasing.
- To compensate, we need to find the linear trend, subtract it from the data, find a new sinusoidal model based on this modified data, and then add back in the linear trend.
- First, find the linear regression model using the raw data and your graphing calculator's **LinReg** function. Store this function in Y1 using the [VARS] menu.
- Now let's subtract out the linear trend from the raw data and create a new column of data. On the calculator, go back into the [STAT] editor and go to the very top of the L_3 column (so L_3 is highlighted) and type in L_2-$Y_1(L_1)$. [L_1 and L_2 can be found as [2nd][1] and [2nd][2], and Y_1 is under [VARS][▸][ENTER][ENTER].] As soon as you hit [ENTER] the list will fill in.
- To find a sinusoidal regression model on the quarter numbers (in L_1) and the modified data (in L_3), you must tell the calculator to use these two columns (by default, it uses L_1 and L_2). On the home screen, type in **SinReg L_1,L_3**.



store the linear regression in Y1



subtract the linear trend

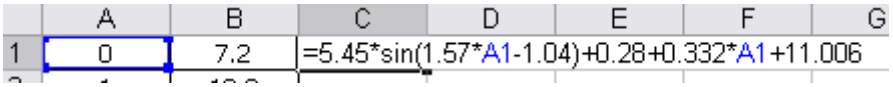


find the new sinusoidal function

Note: Y1(L1) means "Y1 of L1" like f(x) means "f of x". It does not mean multiplication.

4. Graph the new sinusoidal function PLUS the linear trend.

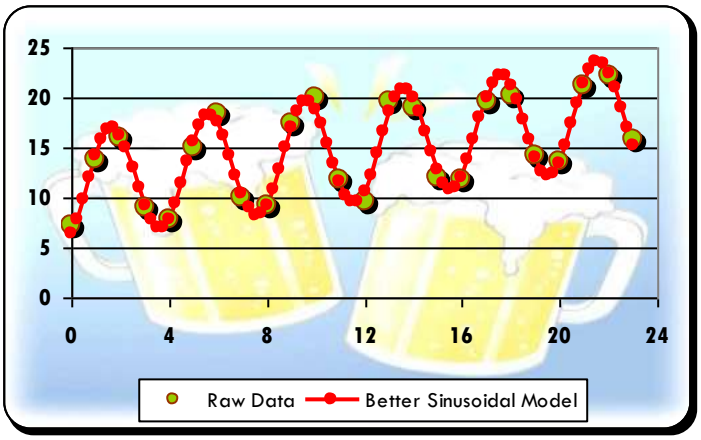
- In Excel, copy the raw data into a new tab in the same workbook.
- In column C, enter a function which is the sum of the new sinusoidal and linear regression functions that you found in part 3.



this is the sine function *this is the linear function*

Remember to use ALL of the decimals. This is just an example.

- Now create a graph as in part 2, where the raw data is just points, and the model is a smoothed curve (do not connect the raw data points). Customize and label this graph and scale the *x*-axis into quarters.
- BONUS: Make the sine graph smoother by going by 0.25 instead of 1.
- Save the Excel worksheet as "Deliverable3" and upload your file to your ePortfolio. Type in a learning outcome reflection in the box provided. Note: use http://eportfolio.cascadia.edu/ for the website and your username and password are the same as for the computers on campus. See instructions in packet for more info.



Also needs Chart title, *x*-axis Label, and *y*-axis Label