Name ______________________

Class ______________________

Problem 1 – Temperature graphs

In this problem, you will graph and find a sinusoidal function.

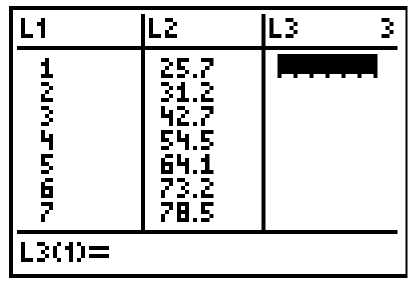
The temperature in Kansas City fluctuates from cold in the winter to hot in the summer. The average, monthly temperature (°F) will be loaded into $\mathbf{L_1}$ and $\mathbf{L_2}$ when you run the program.

Press □ to access the Program menu.

Choose the **KANSTEMP** program and press ⊆. This will load the six lists with the data for all three problems.

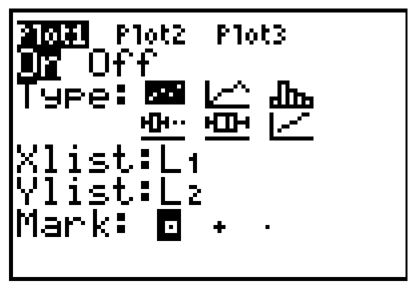
Press □ ⊆ to see the data in the lists. The number of the month is in $\mathbf{L_1}$ and the temperature is in $\mathbf{L_2}$.

Note: The data that appears in $\mathbf{L_3}$ through $\mathbf{L_6}$ will be used later in the activity.



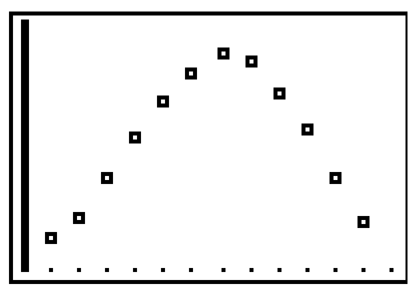
To graph the data, press ψ ο and ⊆ to access **Plot1**.

Make sure that the **Plot1** settings are the same as shown.

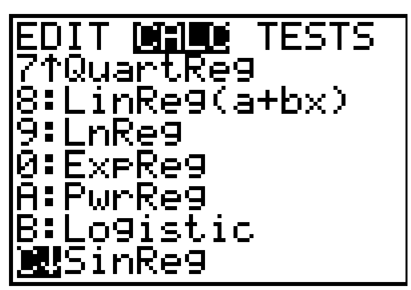


Press θ and select **9:ZoomStat**.

You will get a graph similar to one to the right.



Find the sine equation that models the data. Press □, arrow over to CALC, and select **C:SinReg**. This brings the command to the home screen.

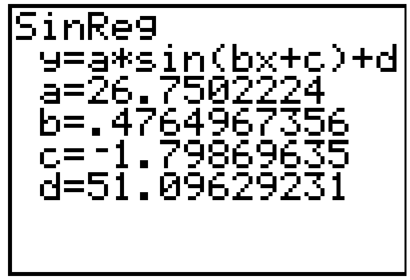


Follow the command by entering **L_1, L_2, Y_1**.

L_1 and **L_2** can be entered by pressing the following keys: ψ [L1] and ψ [L2].

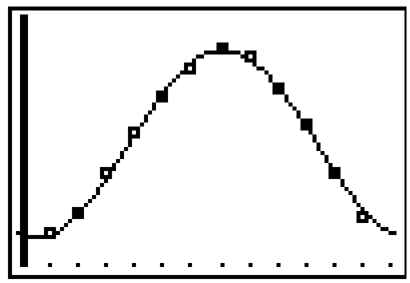
To enter **Y_1**, press □ and ~ to select the **Y-VARS** menu. Then, press ⊆ to select **1:Function…** and select **1:Y_1**.

Press ⊆ and the values for *a*, *b*, *c*, and *d* in the general formula $y = a * \sin(bx+c)+d$ will appear on the screen. The formula is now stored in **Y_1**.



- With two-decimal accuracy, record the sine equation:

Press σ to see the sine regression with the data.

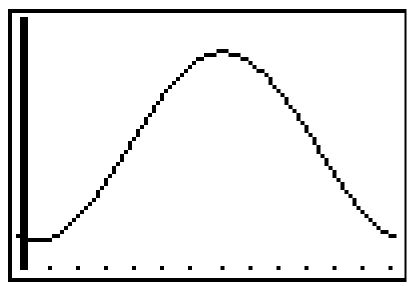


- How well does the sine equation model the data? Explain.

Clean the graph up by hiding the scatter plot.

To hide the scatter plot, press ο and arrow up to highlight **Plot1**. Press ⊆.

Press σ to see the cleaned up graph.



Problem 2 – Hours of Sunlight

The amount of light a location on the Earth receives from the Sun changes each day depending upon the time of year and latitude of that location. The amount of daily sunshine Kansas City experiences has been recorded in the lists where the calendar day is in **L_3**, and the hours of sunlight is **L_4**.

Create the scatter plot, sine equation that models the data and “clean-up” the graph as outlined in Problem 1. To create the scatter plot, make sure to change the **XList** to **L_3** and the **YList** to **L_4**.

In early cultures, certain days of the year had significant importance because of the planting cycle. These days were the winter and summer solstices, and the spring and fall equinoxes. The equinoxes are the days with equal amounts of light and dark. The summer solstice has the greatest amount of sunlight, while the winter solstice has the fewest amount of sunlight.

- With two-decimal accuracy, record the sine equation:

- How well does the sine equation model the data? Explain.

Find the four dates by tracing the equation and record the points below.

- *x1* = ____________________ *y1* = ______________________
- *x2* = ____________________ *y2* = ______________________
- *x3* = ____________________ *y3* = ______________________
- *x4* = ____________________ *y4* = ______________________

Problem 3: Tides

The Bay of Fundy has the highest tides in the world. If a tape measure were attached at the water line of a peer, and the water level height were recorded over a period of eighteen hours, data like that in $\mathbf{L_5}$ and $\mathbf{L_6}$ would be generated.

- With two-decimal accuracy, record the sine equation:

- How well does the sine equation model the data? Explain.

- Find the sinusoidal equation that models this data and predict the water level when the time is 49 hours after the readings were started. Since the sinusoidal regression equation will be stored in $\mathbf{Y_1}$, use the function notation, $\mathbf{Y_1}(49)$ on the home screen to predict the water level at 49 hours.

Additional Practice

The rabbit population in a field fluctuates with the seasons. In January, the cold weather and lack of food reduces the population to 500. In July, the population rises to its high of 800. This cycle repeats itself. Determine a model.

