

Professor Barney and his assistant Ollis are trying to decide where to spend their spring break. Barney favors Chicago while Ollis would like to go to Honolulu. Using the information given in the table below, help them make a decision.

The table gives the normal daily high temperatures for Honolulu H and Chicago C (in degrees Fahrenheit) for month  $t$ , with  $t = 1$  corresponding to January.

T	1	2	3	4	5	6	7	8	9	10	11	12
H	80.1	80.5	81.6	82.8	84.7	86.5	87.5	88.7	88.5	86.9	84.1	81.2
C	29.0	33.5	45.8	58.6	70.1	79.6	83.7	81.8	74.8	63.3	48.4	34.0

- 1) Find a trigonometric model for Honolulu.      2) Find a trigonometric model for Chicago.

- 3) Use a graphing calculator to graph the data points and the model for the temperatures in Honolulu. How well does the model fit?

- 4) Use a graphing calculator to graph the data points and the model for the temperatures in Chicago. How well does the model fit?

- 5) Use the models to estimate the average annual temperature in each city. Which term of the models did you use? Explain.

- 6) What is the period of each model? Are they what you expected? Explain.

- 7) Which city has the greater variability in temperature throughout the year? Which factor of the models determines this variability? Explain.

- 8) Spring break is the last week in March. Which city would be best?

activity: Sinusoidal Regression

- 1) The following table shows the number, in millions, of unemployed people in the labor force for 1984-1995.

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Unemp	8.539	8.312	8.237	7.425	6.701	6.528	7.047	8.628	9.613	8.940	7.996	7.404

- a. Enter the data in your calculator and get a scatterplot, with  $x = 0$  corresponding to 1980.  
 b. Does the data appear to be periodic? If so, find a model using sine regression.  
 c. Do you think this model is likely to be accurate much beyond the year 1995? Why?  
 d. What is the period of the function?  
 e. What is the average number of unemployed people and what part of the model did you use to find it?

- 2) The table shows the average sales  $S$  (in millions of dollars) of an outerwear manufacturer for each month  $t$ , where  $t = 1$  represents January.

T	1	2	3	4	5	6	7	8	9	10	11	12
S	13.46	14.15	8.00	4.85	2.54	1.70	2.54	4.85	8.00	11.15	13.46	14.3

- a. Create a scatter plot of the data.  
 b. Find a trigonometric model that fits the data. Graph the model on your scatter plot.  
 How well does the model fit?  
 c. What is the period of the model? Do you think it is reasonable given the context? Explain  
 d. Interpret the meaning of the model's amplitude in the context of the problem.

- 3) The table shows the average monthly temperature in Chicago, IL, based on data from 1961 to 1990.

Month	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Temp(F)	21.2	25.7	36.7	48.6	59.0	68.4	73.0	71.8	64.2	52.5	39.7	27.3

- a. Use the 12 data points (with  $x = 1$  corresponding to January) to find a periodic model of the data.  
 b. What is the period of the function found in part a? Is this reasonable?  
 c. What is the average annual temperature in Chicago? Which constant in the model did you use?  
 d. What is the amplitude and what does it mean?

- 4) The table shows the average monthly precipitation in inches, in San Francisco, CA, based on data from 1961 to 1990.

Month	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec
Precipitation	4.4	3.2	3.1	1.4	0.2	0.1	0	0.1	0.2	1.2	2.9	3.1

- a. Make a scatter plot of the data.  
 b. Use the sine regression feature on a calculator to find another sinusoidal model for the data.  
 c. What is the period of the function?  
 d. By how much does the precipitation vary in this period?