

SINUSOIDAL Regression

Professor Barney and his assistant Otis are trying to decide where to spend their spring break. Barney favors Chicago while Otis 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.

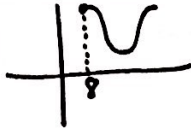
		J	F	M	A	M	J	J	A	S	O	N	D	J
L1 X	T	1	2	3	4	5	6	7	8	9	10	11	12	13
L2 Y	H	80.1 Min	80.5	81.6	82.8	84.7	86.5	87.5	88.7 Max	88.5	86.9	84.1	81.2	
	C	29.0	33.5	45.8	58.6	70.1	79.6	83.7	81.8	74.8	63.3	48.4	34.0	

positive cosine

pos cosine

1) Find a trigonometric model for Honolulu.

Amp vs-min = 4.3
 V.S. $\frac{\text{Max} + \text{Min}}{2} = 84.4^\circ$
 Period: 12 $b = \frac{2\pi}{12} = \frac{\pi}{6}$
 P.S. 8



2) Find a trigonometric model for Chicago.

Amp 27.4
 v.s. 56.4
 Per 12 $b = \frac{\pi}{6}$
 P.S. 7

$$y = 27.4 \cos\left[\frac{\pi}{6}(x-7)\right] + 56.4$$

↑
.524

$$y = 4.3 \cos\left[\frac{\pi}{6}(x-8)\right] + 84.4$$

↑
.524

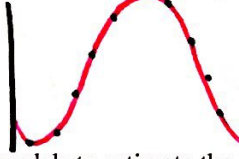
3) Use a graphing calculator to graph the data points and the model for the temperatures in Honolulu. How well does the model fit?



$$y = 4.24 \sin(.51x - 2.44) + 84.34$$

The model approximates the data well.

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



$$y = 28.58 \sin(.47x - 1.81) + 55.7$$

The model approximates the data well.

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

Hon 84.34°

Chicago 55.7°

Use the vertical shift for the average temp b/c the midline is the average of the max & min.

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

Hon: $\frac{2\pi}{.51} = 12.3$ months Chicago: $\frac{2\pi}{.47} = 13.4$

Both are approx. 12 months. Chicago is a bit longer than expected.

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

Hon: 4.24°

Chicago: 28.58°

Chicago has the greater variability in temp.

* Use the amplitude for variability.

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

Honolulu For warm weather.