**Homework: 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 |

Enter the data in your calculator and get a scatterplot, with x = 0 corresponding to 1980.

1. Does the data appear to be periodic? If so, find a model using sine regression.
2. Do you think this model is likely to be accurate much beyond the year 1995? Why?
3. What is the period of the function?
4. 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 |

1. Create a scatter plot of the data in your calculator.
2. Find a trigonometric model that fits the data. Graph the model on your scatter plot.

How well does the model fit?

1. What is the period of the model? Do you think it is reasonable given the context? Explain
2. . 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.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 |

1. Use the 12 data points (with x = 1 corresponding to January) to find a periodic model of the data.
2. What is the period of the function found in part a? Is this reasonable?
3. What is the average annual temperature in Chicago? Which constant in the model did you use?
4. 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 |

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