# Linear Modeling
# Part I, Version 2

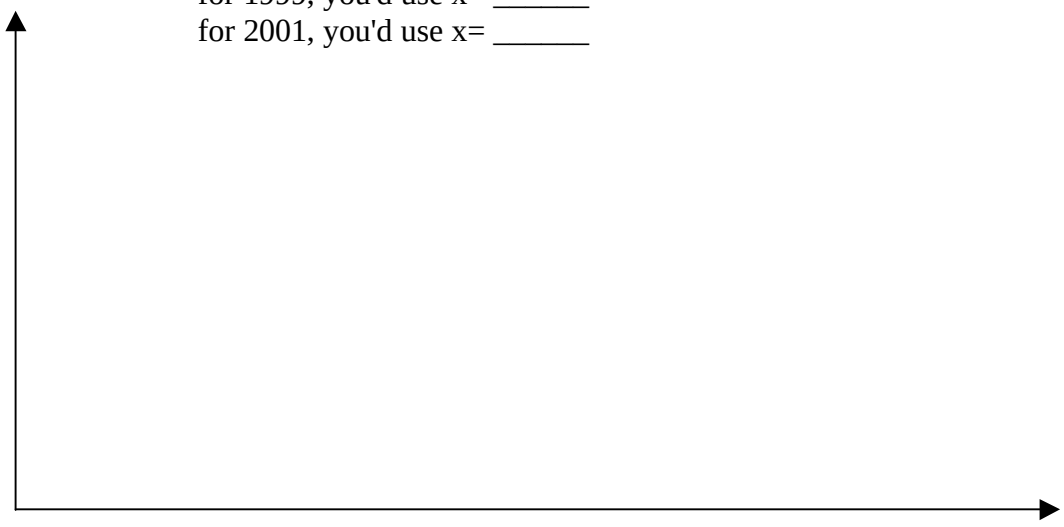
According to S.C. Vital and Mortality Statistics, the following is the Infant Mortality Rate per 1000 live births for South Carolina for selected years between 1982 and 1994.

| Year | 1982 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1992 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|
| Infant Mortality (rate per 1000 live births) | 16.1 | 14.7 | 14.2 | 13.2 | 12.8 | 12.2 | 12.8 | 11.6 | 10.5 | 9.4 |

1. Examine the data and describe the trends in words:

2. Construct a plot of the data. Since we are examining how Infant Mortality changes "with respect to" time (or as a function of time), we use time as our independent variable, or x-value, and plot it on the horizontal axis; Infant Mortality Rate as our dependent variable, or y-value, and plot it on the vertical axis.

   NOTE: To streamline our calculations later, you may wish to think of 1980 as time x=0, and use x=2 for 1982, x=3 for 1983, etc. With this labeling system, if you later wished to project Infant Mortality Rate
   for 1995, you'd use x= _____
   for 1999, you'd use x= _____
   for 2001, you'd use x= _____



3. Describe your graph in words:

4. Choose any three of your data points and label them A, B, and C.
Write the coordinates here:

| | X | Y |
|---|---|---|
| A | | |
| B | | |
| C | | |

5. Find the slope of the line through A and B. [Remember that slope is simply the change in y divided by the change in x.]

Slope of AB= _____

Interpret this number in the context of the data: _____

_____

6. Now write the equation of the line though A and B:
Since
slope m = (change in y) / (change in x), y = _____
(change in y) = m (change in x)
or $y - y_1 = m (x-x_1)$.

$y_1$ and $x_1$: y- and x- coordinates of given pt.

Have you simplified your equation so you can use it to predict y from x?

7. According to your equation, what would you predict the Infant Mortality Rate to be in
1995? _____
1999? _____
2001? _____

8. What was the y-intercept of your equation? _____ Interpret this value in the context of the data. _____
_____

9. Is there an x-intercept of your equation? _____ If not, why not? If so, interpret this value in the context of the data. _____
_____

10. Does your line appear to "fit" the data points? Comment: _____
_____

Repeat this activity for points B and C:

Slope: _____ Line Equation: _____

Prediction for '95: _____ '99: _____ '01: _____

y-intercept: _____ x-intercept: _____

Repeat this activity for points A and C.

Slope: _____ Line Equation: _____

Prediction for '95: _____ '99: _____ '01: _____

y-intercept: _____ x-intercept: _____

Of the three slopes you found, which would you guess is closest to the slope of the line which "best fits" the data, and why?

_____

_____

Would it be possible to choose two points such that the slope, and the equation you found from them, would be "way off?" Discuss:

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