

Linear Modeling

Part I

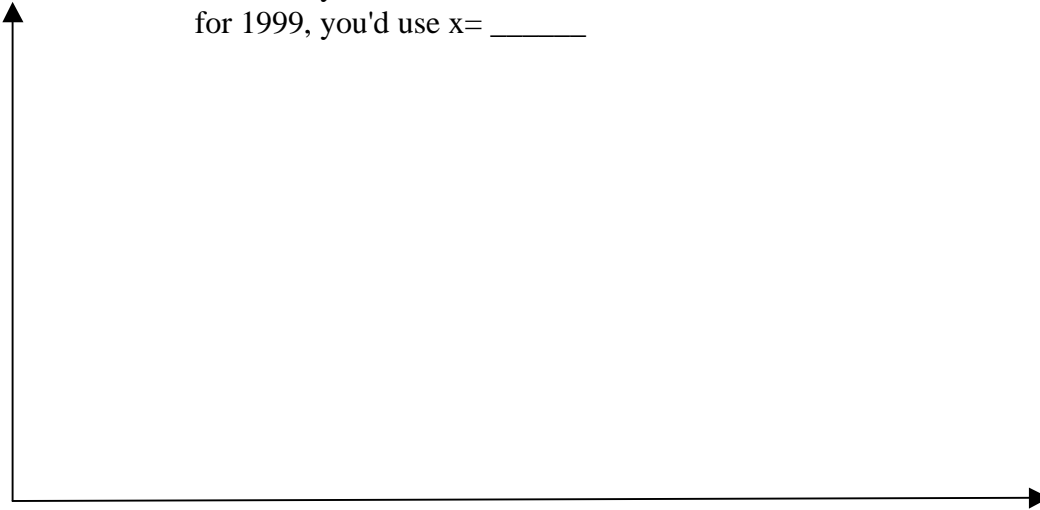
According to S.C. Vital and Mortality Statistics, the following is the Infant Mortality Rate per 1000 live births for South Carolina, 1982-1990.

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990
Infant Mortality (rate per 1000 live births)	16.1	15.0	14.7	14.2	13.2	12.8	12.2	12.8	11.6

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 1992, you'd use $x=$ _____
for 1995, you'd use $x=$ _____
for 1999, 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 through A and B:

Since

slope $m = (\text{change in } y) / (\text{change in } x)$,

$y =$ _____

$(\text{change in } y) = m (\text{change in } x)$

or $y - y_1 = m (x - x_1)$.

↑ ↑
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
1992? _____
1995? _____
1999? _____

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?

Repeat this activity for points B and C:

Slope: _____ Line Equation: _____

Prediction for '92: _____ '95: _____ '99: _____

y-intercept: _____ x-intercept: _____

Repeat this activity for points A and C.

Slope: _____ Line Equation: _____

Prediction for '92: _____ '95: _____ '99: _____

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: