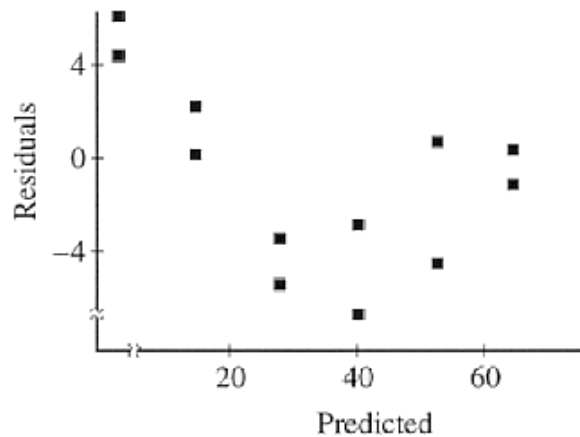


In a study of the application of a certain type of weed killer, 14 fields containing large numbers of weeds were treated. The weed killer was prepared at seven different strengths by adding 1, 1.5, 2, 2.5, 3, 3.5, or 4 teaspoons to a gallon of water. Two randomly selected fields were treated with each strength of weed killer. After a few days, the percentage of weeds killed on each field was measured. The computer output obtained from fitting a least squares regression line to the data is shown below. A plot of the residuals is provided as well.

Dependent variable is: percent killed
R squared = 97.2% R squared (adjusted) = 96.9%
 $s = 4.505$ with $14 - 2 = 12$ degrees of freedom

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	8330.16	1	8330.16	410
Residual	243.589	12	20.2990	

Variable	Coefficient	s.e. of Coeff	t-ratio	Prob
Constant	-20.5893	3.242	-6.35	≤ 0.0001
No. Teaspoons	24.3929	1.204	20.3	≤ 0.0001

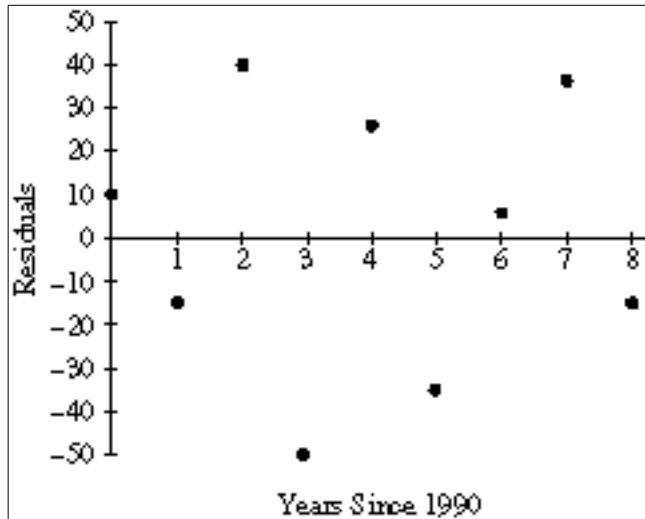


- (a) What is the equation of the least squares regression line given by this analysis? Define any variables used in this equation.
- (b) If someone uses this equation to predict the percentage of weeds killed when 2.6 teaspoons of weed killer are used, which of the following would you expect?
 - The prediction will be too large.
 - The prediction will be too small.
 - A prediction cannot be made based on the information given on the computer output.

Explain your reasoning.

Show all your work. Indicate clearly the methods you use, because you will be graded on the correctness of your methods as well as on the accuracy of your results and explanation.

Lydia and Bob were searching the Internet to find information on air travel in the United States. They found data on the number of commercial aircraft flying in the United States during the years 1990-1998. The dates were recorded as years since 1990. Thus, the year 1990 was recorded as year 0. They fit a least squares regression line to the data. The graph of the residuals and part of the computer output for their regression are given below.



Predictor	Coef	Stdev	t-ratio	p
Constant	2939.93	20.55	143.09	0.000
Years	233.517	4.316	54.11	0.000

s = 33.43

- Is a line an appropriate model to use for these data? What information tells you this?
- What is the value of the slope of the least squares regression line? Interpret the slope in the context of this situation.
- What is the value of the intercept of the least squares regression line? Interpret the intercept in the context of this situation.
- What is the predicted number of commercial aircraft flying in 1992 ?
- What was the actual number of commercial aircraft flying in 1992 ?