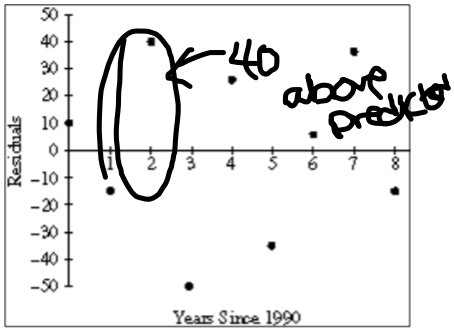
"FRAPPY"

{Free Response AP Problem...Yay!}

2001 Problem #1

The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 15 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

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.



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				

R^2

Scoring:

(a) Is a line an appropriate model to use for these data? What information tells you this?

E P I

Yes- the residual plot has no pattern

$\frac{\Delta Y}{\Delta X}$ → $\frac{\text{aircraft}}{\text{years}}$

(b) What is the value of the slope of the least squares regression line? Interpret the slope in the context of this situation.

E P I

233.517

As years increase by 1, we predict aircraft to increase by 233.517.

(c) What is the value of the intercept of the least squares regression line? Interpret the intercept in the context of the situation.

E P I

2939.93 At year 0 (1990), we predict the number of aircraft to be 2939.93.

$\widehat{aircraft} = 2939.93 + 233.517(2)$

(d) What is the predicted number of commercial aircraft flying in 1992?

E P I

3406.964

≈ 3407

(e) What is the actual number of commercial aircraft flying in 1992?

E P I

3407 + 40 > 3447