



# “FRAPPY” {Free Response AP Problem...Yay!}

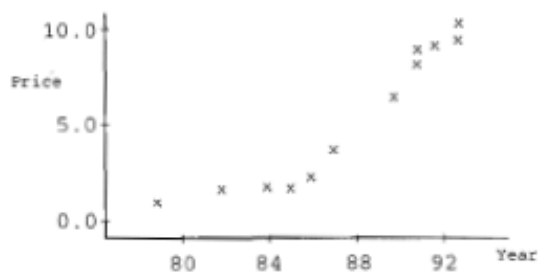
The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 25 minutes. You will be graded based on the AP rubric and will earn a score of 0-4. After grading, keep this problem in your binder for your AP Exam preparation.

You are planning to sell a used 1988 automobile and want to establish an asking price that is competitive with that of other cars of the same make and model that are on the market. A review of newspaper advertisements for used cars yields the following data for 12 different cars of this make and model. You want to fit a least squares regression model to these data for use as a model in establishing the asking price for your car.

Production Year	1990	1991	1992	1987	1993	1991	1993	1985	1984	1982	1986	1979
Asking Price (in thousands of dollars)	6.0	7.7	8.8	3.4	9.8	8.4	8.9	1.5	1.6	1.4	2.0	1.0

The computer printouts for three different linear regression models are shown below. Model 1 fits the asking price as a function of the production year, Model 2 fits the natural logarithm of the asking price as a function of the production year, and Model 3 fits the square root of the asking price as a function of the

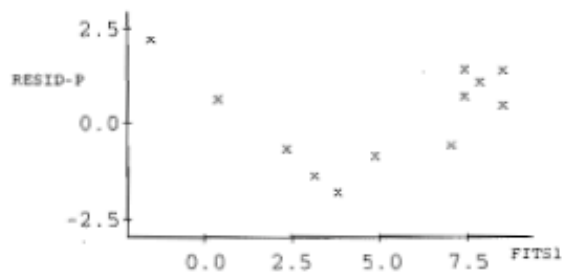
Model 1



The regression equation is  
Price = -58.1 + 0.719 Year.

Predictor	Coef	Stdev	t-ratio	p
Constant	-58.050	7.205	-8.06	0.000
Year	0.71900	0.08200	8.77	0.000

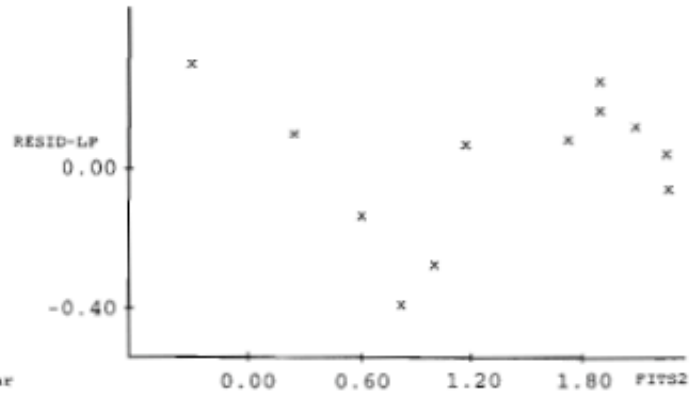
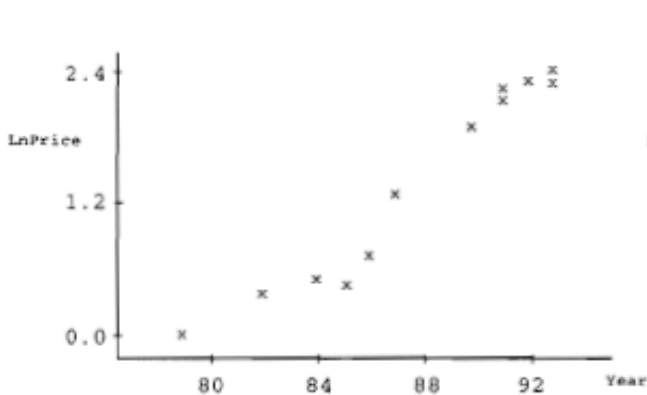
s = 1.255      R-sq = 88.5%



Analysis of Variance

SOURCE	DF	SS	MS	F	P
Regression	1	121.10	121.10	76.88	0.000
Error	10	15.75	1.58		
Total	11	136.85			

### Model 2



The regression equation is  
 $\text{LnPrice} = -14.9 + 0.185 \text{ Year}$ .

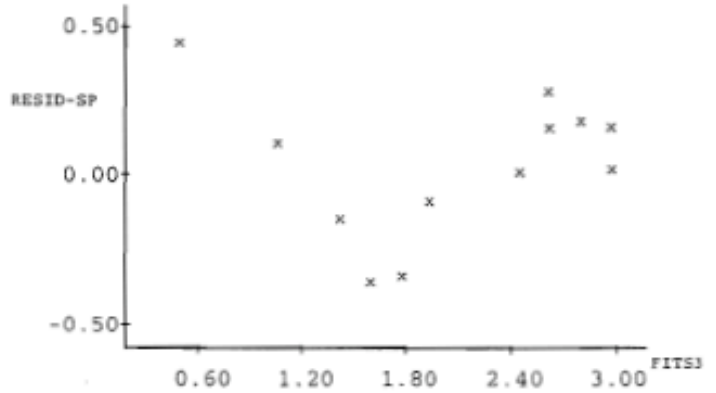
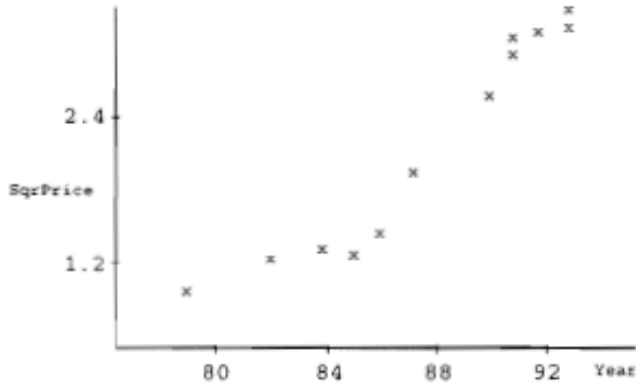
Predictor	Coef	Stdev	t-ratio	p
Constant	-14.924	1.223	-12.21	0.000
Year	0.18502	0.01392	13.30	0.000

s = 0.2130      R-sq = 94.6%

### Analysis of Variance

SOURCE	DF	SS	MS	F	p
Regression	1	8.0190	8.0190	176.77	0.000
Error	10	0.4536	0.0454		
Total	11	8.4726			

### Model 3



The regression equation is  
 $\text{SqrPrice} = -13.3 + 0.176 \text{ Year}$ .

Predictor	Coef	Stdev	t-ratio	p
Constant	-13.313	1.447	-9.20	0.000
Year	0.17559	0.01647	10.66	0.000

s = 0.2520      R-sq = 91.9%

### Analysis of Variance

SOURCE	DF	SS	MS	F	p
Regression	1	7.2221	7.2221	113.72	0.000
Error	10	0.6351	0.0635		
Total	11	7.8572			

(a) Use Model 1 to establish an asking price for your 1988 automobile.

(b) Use Model 2 to establish an asking price for your 1988 automobile.

(c) Use Model 3 to establish an asking price for your 1988 automobile.

(d) Describe any shortcomings you see in these three models.

(e) Use some or all of the given data to find a better method for establishing an asking price for your 1988 automobile. Explain why your method is better.

**Total: \_\_/4**