Chapter 4 "FRAPPY"

{Free Response AP Problem...Yay!}

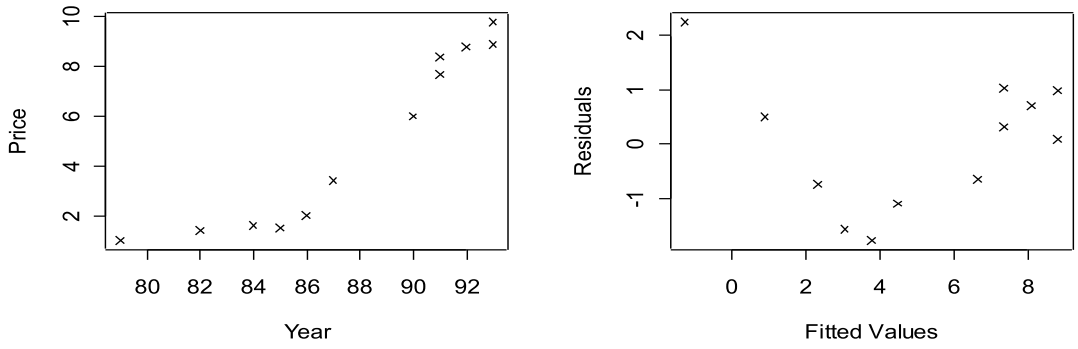
The following problem is taken from an actual Advanced Placement Statistics Examination. Your task is to generate a complete, concise statistical response in 30 minutes - You should expect to spend 30-35 minutes on the "Investigative Task". You will be graded based on the AP rubric and will earn a score 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 an asking price for your car.

Production Year	1990	1991	1992	1987	1993	1991	1993	1985	1984	1982	1986	1979
Asking Price (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 prices 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 production year. Each printout also includes a plot of the residuals from the linear model *versus* the fitted values, as well as additional descriptive data produced from the least squares procedure.

Model 1



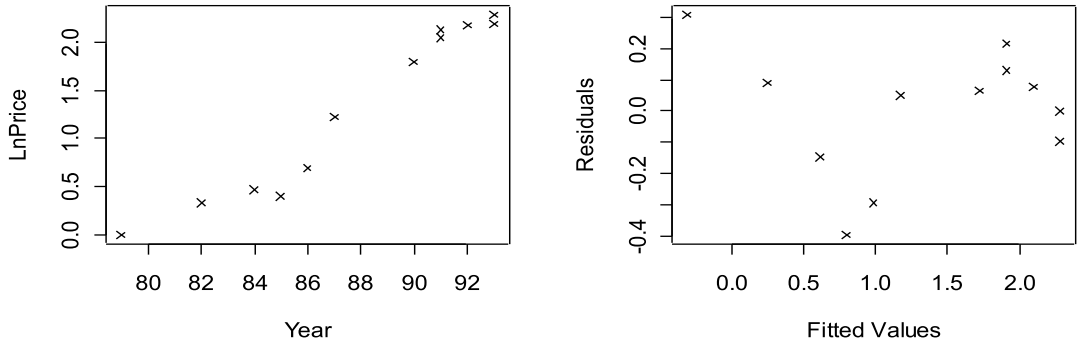
The regression equation is Price = -58.1 + 0.719 Year.

s = 1.255 R-sq = 88.5%

Variable	Coefficient	Stdev	t-ratio	prob
Constant	-58.0503	7.205	-8.06	0.000
Year	0.718997	0.082	8.77	0.000

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	121.097	1	121.097	76.9
Residual	15.7521	10	1.57521	

Model 2



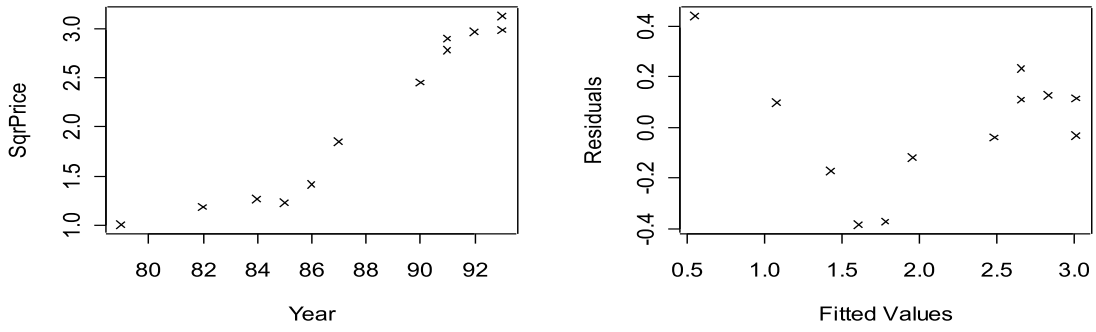
The regression equation is LnPrice = -14.9 + 0.185 Year.

s = 0.213 R-sq = 94.6%

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	8.01898	1	8.01898	177
Residual	0.453645	10	0.0453645	

Variable	Coefficient	Stdev	t-ratio	prob
Constant	-14.9244	1.223	-12.2	0.000
Year	0.185021	0.01392	13.3	0.000

Model 3



The regression equation is SqrPrice = -13.3 + 0.176 Year.

s = 0.252 R-sq = 91.9%

Source	Sum of Squares	df	Mean Square	F-ratio
Regression	7.22212	1	7.22212	114
Residual	0.635106	10	0.0635106	

Variable	Coefficient	Stdev	t-ratio	prob
Constant	-13.3133	1.447	-9.2	0.000
Year	0.175587	0.01647	10.7	0.000

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

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

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

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

E P I (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