

# TEST 2

## STAT 572

### Spring 1997

1. A study was conducted by a architecture professor to investigate the effect of several characteristics on the value of a building. The main objective of the study was to assess the contribution of the architectural quality of the building on its value. The data consist of information on 60 large office buildings in Boston, MA. The response was the monthly rent per square foot for the second quarter of 1990 (RENT). After doing selection of variables, the postulated MLR model included the following regressors:

- YEAR      year of construction (range: 1960-1990)
- SQFEET    total rentable area (range: 92K-2,000K)
- ONSITE    onsite parking (0) or not (1)
- RATING    measure of the architectural quality (range of 0 [low] to 5 [high])

The results of the analysis appear below

#### Response: Rent Summary of Fit

RSquare	0.416592
RSquare Adj	0.374162
Root Mean Square Error	4.610944
Mean of Response	29.333333
Observations (or Sum Wgts)	60

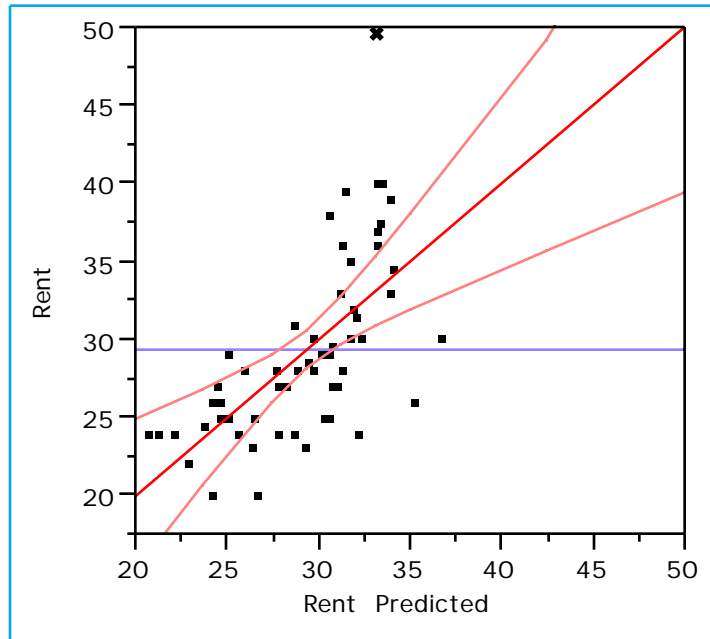
#### Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t	VIF
Intercept	-218.9303	148.2461	-1.48	0.1454	0
Year	0.1235521	0.074984	1.65	0.1051	1.1687986
Sqfeet	0.0000039	0.000002	2.42	0.0189	1.2514472
Onsite	-5.366674	1.435896	-3.74	0.0004	1.181497
Rating	1.3140235	0.702034	1.87	0.0666	1.1036678

#### Effect Test

Source	Nparm	DF	Sum of Squares	F Ratio	Prob>F
Year	1	1	57.72297	2.7150	0.1051
Sqfeet	1	1	124.43231	5.8527	0.0189
Onsite	1	1	296.99140	13.9690	0.0004
Rating	1	1	74.48516	3.5034	0.0666

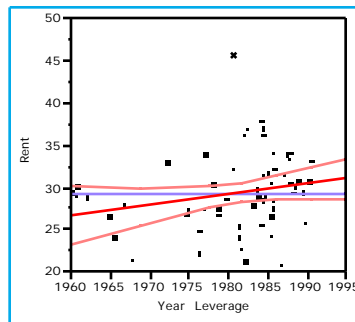
### Whole-Model Test



### Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	834.9889	208.747	9.8184
Error	55	1169.3444	21.261	Prob>F
C Total	59	2004.3333		<.0001

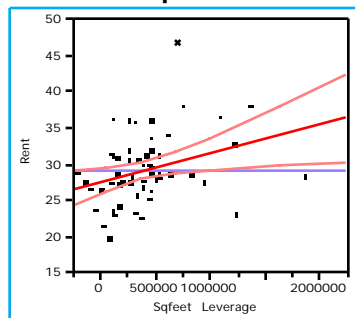
### Year



### Effect Test

Sum of Squares	F Ratio	DF	Prob>F
57.722969	2.7150	1	0.1051

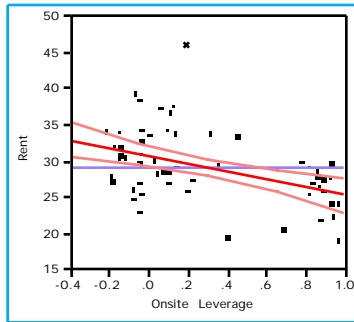
### Sqfeet



### Effect Test

Sum of Squares	F Ratio	DF	Prob>F
124.43231	5.8527	1	0.0189

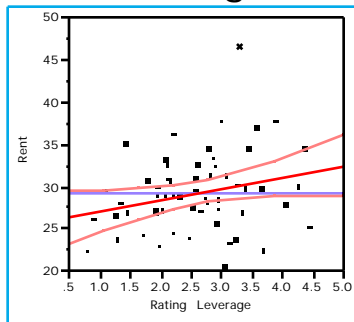
### Onsite



### Effect Test

Sum of Squares	F Ratio	DF	Prob>F
296.99140	13.9690	1	0.0004

### Rating



### Effect Test

Sum of Squares	F Ratio	DF	Prob>F
74.485155	3.5034	1	0.0666

a) Comment on the overall fit of the model

b) Does the architectural quality has an effect on the value of the building? Explain.

c) Compute the  $R^2$  that would result if the variable RATING is deleted from the model.

d) Explain the meaning of the coefficient for ONSITE.

e) Describe the characteristics of observation 26 which is marked with an X. I. e., determine the relative magnitude of: residual, leverage, COVRATIO, DFBETAS, etc.

f) Observation 26 has a residual of 16.13 and leverage of .0455. What would be SSE if this observation is deleted? How about  $R^2$ ?

2. Determine the truthfulness or falseness of the following propositions. **Justify your answers.** [Pictures may help]

T F A few observations can have a considerable influence on the collinearity structure of the problem.

T F The correlation between W and Y is 0.90. Therefore, a good model to predict Y should contain W.

T F The prediction capability of a model constructed with any type of variable selection procedure is overstated by the  $R^2$  of the model.

T F When the level of collinearity is high, the model is practically useless.