

Stat 320

Key answer to HW3

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Problem I: 30 points

Data: Fan3

Variables:

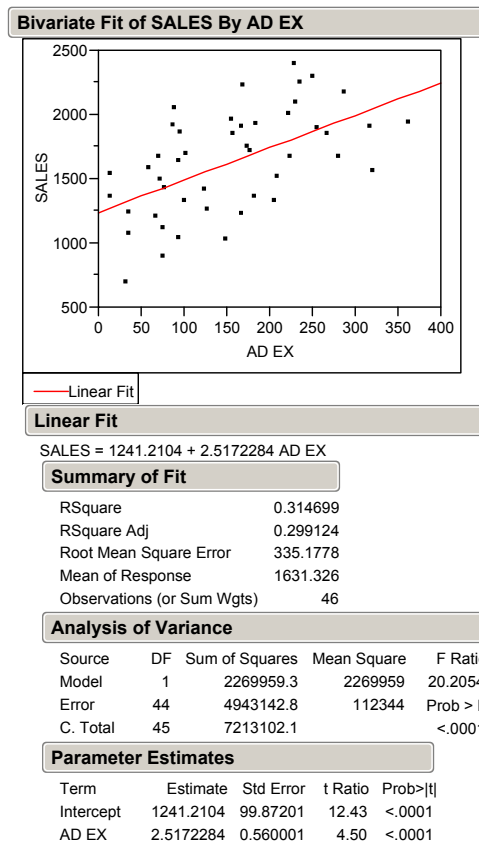
Sales: total monthly sales in thousands of \$

Adex: advertising expense in thousands of \$

Mtgrate: mortgage rate for 30-years loans (%)

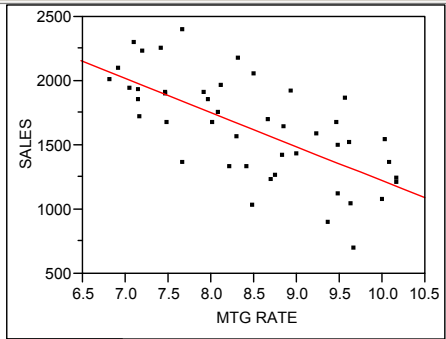
Hsstarts: housing starts in thousands of units

Sales versus ADEX



Sales versus Mtgrate

Bivariate Fit of SALES By MTG RATE



— Linear Fit

Linear Fit

SALES = 3899.4712 - 267.42195 MTG RATE

Summary of Fit

RSquare	0.458757
RSquare Adj	0.446456
Root Mean Square Error	297.8728
Mean of Response	1631.326
Observations (or Sum Wgts)	46

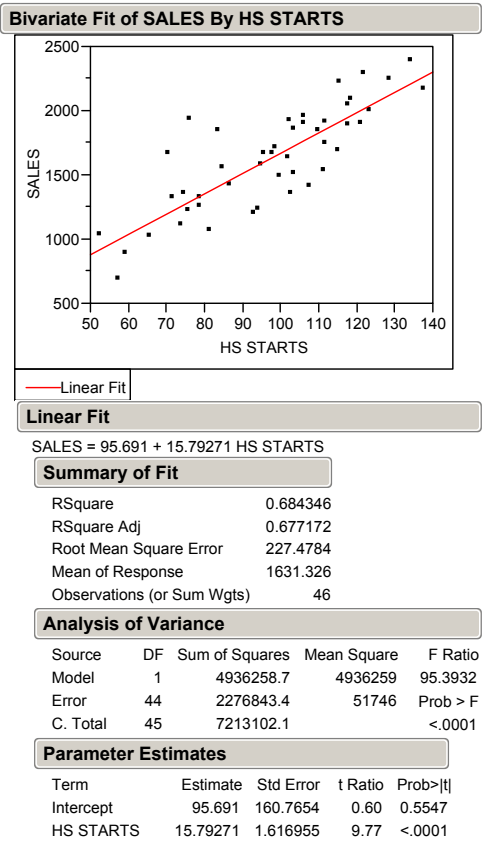
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	3309061.3	3309061	37.2944
Error	44	3904040.9	88728	Prob > F
C. Total	45	7213102.1		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	3899.4712	373.994	10.43	<.0001
MTG RATE	-267.422	43.79005	-6.11	<.0001

Sales versus Hsstarts



Summarizing the output of the three models

Models	R ²	S	t-ratio for β_1
Sales versus ADEX	31%	335.1	4.50
Sales versus MTGRATE	45%	297.8	-6.11
Sales versus HSSTARTS	68%	227.4	9.77

It seems that the third model is better in predicting future sale. The third model explain much better the variation in sales, and the variable Hsstarts is very important in predicting future sale.

Problem II: 50 points, 10 for each

- Data: beta 3
- Variables are:
- Y: return on the stock
- X: the return on the market

Walmartret: return on the stock of Walmart
 Dellret: return on the stock of Dell
 Sabreret: return on the stock of Sabre
 Mktret: return on the market

(a)

The The beta coefficient or the company systematic risk is summarized in the following table:

$$\text{WALMARTRET} = 0.019769 + 0.7316693 \text{ MKTRET}$$

$$\text{DELLRET} = 0.0279993 + 1.6679147 \text{ MKTRET}$$

$$\text{SABRERET} = 0.002524 + 1.4706296 \text{ MKTRET}$$

beta	β_{Wal}	β_{Dell}	β_{Sab}
	0.7316693	1.6679147	1.4706296
T-ratio	3.83	5.12	5.99

(b)

WalMart: $\beta_{mktret} = 0$ versus $\beta_{mktret} \neq 0$

t-ratio=3.83

p-value=0.0003

Decision: reject the null hypothesis

Significant effect of Market return on the walmart return

Parameter Estimates				
Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	0.019769	0.010825	1.83	0.0730
MKTRET	0.7316693	0.191214	3.83	0.0003

Dell: $\beta_{mktret} = 0$ versus $\beta_{mktret} \neq 0$

t-ratio=5.12

p-value=0.0001

Decision: reject the null hypothesis

Significant effect of Market return on Dell return

Parameter Estimates				
Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	0.0279993	0.018458	1.52	0.1347
MKTRET	1.6679147	0.326046	5.12	<.0001

Sabre: $\beta_{mktret} = 0$ versus $\beta_{mktret} \neq 0$

t-ratio=5.99

p-value=0.0001

Decision: reject the null hypothesis

Significant effect of Market return on Sabre return

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	0.002524	0.013899	0.18	0.8565
MKTRET	1.4706296	0.245524	5.99	<.0001

c)

WalMart: $\beta_{mktret} = 1$ versus $\beta_{mktret} \neq 1$

t-ratio=-1.421053

p-value=0.16

Dell: $\beta_{mktret} = 1$ versus $\beta_{mktret} \neq 1$

t-ratio= 2.0625

p-value=0.04

Sabre: $\beta_{mktret} = 1$ versus $\beta_{mktret} \neq 1$

t-ratio=1.95

p-value=0.05

It seems that only Dell has a beta significantly different than one at 5% level of significance

d)

Dell: $\beta_{mktret} < 1$ versus $\beta_{mktret} > 1$

t-ratio= 2.0625

p-value=0.021

Decision: reject the null hypothesis

Beta for Dell is significantly greater than one.

e)

WalMart: $\beta_{mktret} > 1$ versus $\beta_{mktret} < 1$

t-ratio=-1.421053

p-value=0.08

Do not reject null hypothesis

Beta for Walmart is not significantly less than one at 5% level of significance.

Problem III:20 points

Data Mlb3

Variables are:

wins: number of games won

Hr: number of home runs hit

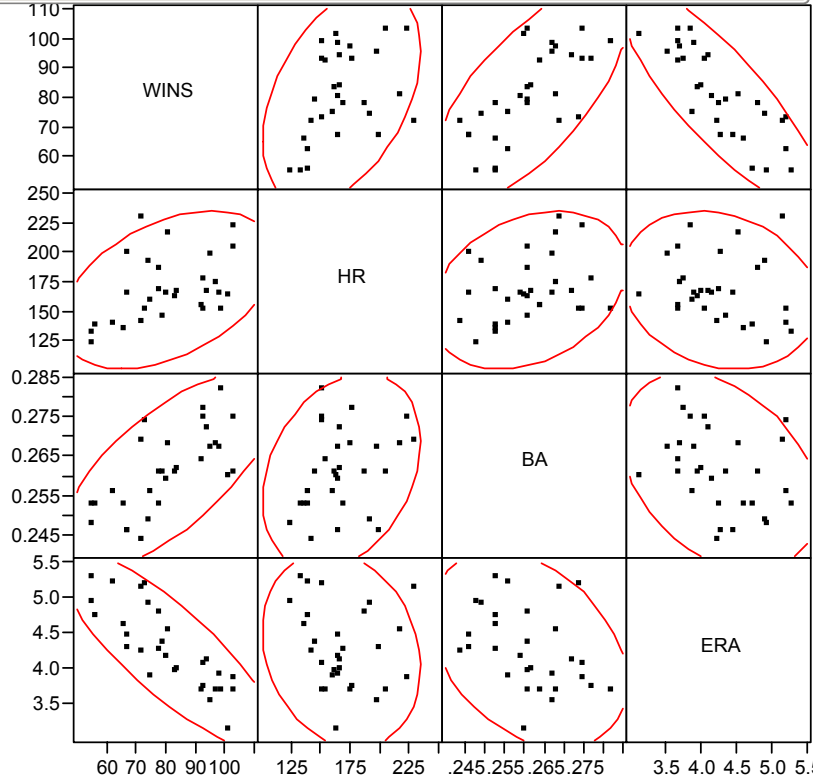
Ba: average batting average

Era: Earned run average

Multivariate

	WINS	HR	BA	ERA
WINS	1.0000	0.4225	0.6920	-0.8227
HR	0.4225	1.0000	0.2960	-0.1829
BA	0.6920	0.2960	1.0000	-0.3428
ERA	-0.8227	-0.1829	-0.3428	1.0000

Scatterplot Matrix

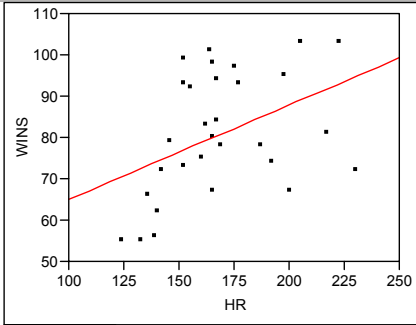


Coefficient of correlation between wins and Era is the largest: -0.82

Let's investigate more:

Fit Y by X Group

Bivariate Fit of WINS By HR



Linear Fit

Linear Fit

WINS = 42.383484 + 0.2280086 HR

Summary of Fit

RSquare	0.178485
RSquare Adj	0.149145
Root Mean Square Error	13.60874
Mean of Response	80.83333
Observations (or Sum Wgts)	30

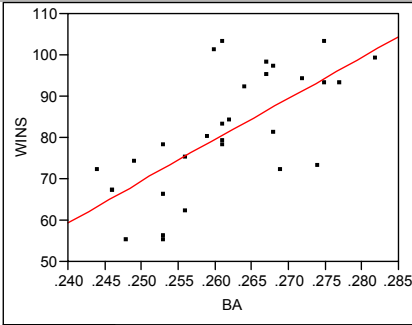
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	1126.6285	1126.63	6.0834
Error	28	5185.5382	185.20	Prob > F
C. Total	29	6312.1667		0.0200

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	42.383484	15.7859	2.68	0.0121
HR	0.2280086	0.092444	2.47	0.0200

Bivariate Fit of WINS By BA



Linear Fit

Linear Fit

WINS = -182.2523 + 1006.7054 BA

Summary of Fit

RSquare	0.478885
RSquare Adj	0.460274
Root Mean Square Error	10.8387
Mean of Response	80.83333
Observations (or Sum Wgts)	30

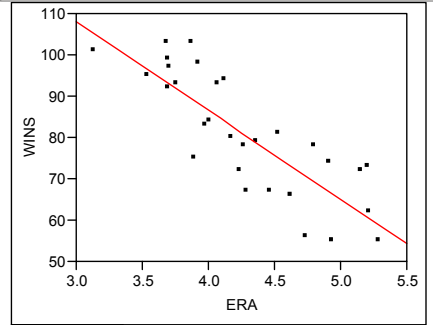
Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	3022.8008	3022.80	25.7309
Error	28	3289.3659	117.48	Prob > F
C. Total	29	6312.1667		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	-182.2523	51.90216	-3.51	0.0015
BA	1006.7054	198.4608	5.07	<.0001

Bivariate Fit of WINS By ERA



Linear Fit

Linear Fit

WINS = 172.66235 - 21.493879 ERA

Summary of Fit

RSquare	0.67687
RSquare Adj	0.66533
Root Mean Square Error	8.534906
Mean of Response	80.83333
Observations (or Sum Wgts)	30

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	4272.5175	4272.52	58.6525
Error	28	2039.6492	72.84	Prob > F
C. Total	29	6312.1667		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	172.66235	12.09131	14.28	<.0001
ERA	-21.49388	2.806542	-7.66	<.0001

R^2 for Wins versus Era is the largest 67%
 s for Wins versus Era is the smallest: 8.53
 The slope of Era is the most signifiant ($t\text{-ratio}(\beta_{era})=-7.66$)