

FINAL EXAM STAT 572
Spring 2001

Instructions : You are to provide your own answers to every problem. Direct references to the notes, book, or other source will not be accepted.

1. Do young marketers tend to be more aggressive than older marketers? To answer this question, a survey of 1,076 members of the American Marketing Association was administered to measure the tendency for aggressiveness. The correlation coefficient between age and aggressiveness was found to be $r = -.20$.

a) Can you conclude (with any authority) that age is related to aggressiveness? Explain. (10 p)

b) Explain the nature of this relationship. (5 p)

2. In any production process involving multiple workers engaged in a variety of tasks, the total time spent in production varies as a function of the size of the work pool and the level of output of the various activities. Data were collected to study the factors that are more related to the total number of hours (y) worked per day by the clerical staff in a large department store. A portion of the data appears below.

Day	Total Hours	Pieces of Mail Processed	Money Orders and Certificates	Window Payments	Change Orders	Checks Cashed
M	128.5	7781	100	886	235	644
T	113.6	7004	110	962	388	589
W	146.6	7267	61	1342	398	1081
Th	124.3	2129	102	1153	457	891
F	100.4	4878	45	803	577	537
S	119.2	3999	144	1127	345	563
M	109.5	11777	123	627	326	402
T	128.5	5764	78	748	161	495
W	131.2	7392	172	876	219	823
Th	112.2	8100	126	685	287	555
F	95.4	4736	115	436	235	456
S	124.6	4337	110	899	127	573
M	103.7	3079	96	570	180	428
T	103.6	7273	51	826	118	463
W	133.2	4091	116	1060	206	961
Th	111.4	3390	70	957	284	745
F	97.7	6319	58	559	220	539
S	132.1	7447	83	1050	174	553
M	135.9	7100	80	568	124	428
T	131.3	8035	115	709	174	498

The day of the week was included because the manager knew that there was an effect of day and wanted to adjust for it. The result of fitting the MLR model appears in the following page.

a) Discuss the differences among days of the week. Which seems to be the busiest? (5 p)

RSquare	0.615879
RSquare Adj	0.522191
Root Mean Square Error	10.74028
Mean of Response	117.3769
Observations (or Sum Wgts)	52

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	10	7583.018	758.302	6.5737
Error	41	4729.494	115.354	Prob > F
C. Total	51	12312.512		<.0001

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	74.039762	9.337119	7.93	<.0001
Day[F]	-5.461006	3.745813	-1.46	0.1525
Day[M]	1.4088212	3.673615	0.38	0.7033
Day[S]	-0.030484	4.317647	-0.01	0.9944
Day[T]	6.1156201	3.446245	1.77	0.0834
Day[Th]	-6.582333	3.467373	-1.90	0.0647
Pieces of mail processed	0.0009239	0.000914	1.01	0.3179
Money orders and certificates sold	0.0808586	0.046658	1.73	0.0906
Window payments transacted	0.0119762	0.010028	1.19	0.2392
Change Order processed	-0.036485	0.017926	-2.04	0.0483
Checks cashed	0.0489585	0.013465	3.64	0.0008

Effect Tests

Source	Nparr	DF	Sum of Squares	F Ratio	Prob > F
Day	5	5	1006.6161	1.7453	0.1460
Pieces of mail processed	1	1	117.9422	1.0224	0.3179
Money orders and certificates sold	1	1	346.4451	3.0033	0.0906
Window payments transacted	1	1	164.5436	1.4264	0.2392
Change Order processed	1	1	477.8494	4.1425	0.0483
Checks cashed	1	1	1525.0819	13.2209	0.0008

b) Interpret the effect of Checks cashed on the hours worked (5 p)

c) The manager notices that the coefficient of Change Orders processed is negative and is confused. Does this mean that as the number of Change orders processed increase, the number of work hours decrease? Answer this question and clarify the confusion. (5 p)

3. Explain in detail the type of curve that is fitted by the following piecewise model:

$$E(y) = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 x^3 + \beta_4 (x - t_1)_+^3 + \beta_5 (x - t_2)_+^3$$

$$\text{where } x_+ = \begin{cases} x & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$$

[Hint: Graphs can help] (10 p)

4. Explain what are "adjusted (or partial) effects" and why they are so important. (10 p)

5. Comment on the positives and the negatives of stepwise regression. (10 p)