

TEST 1
STAT 461
Fall 1996

NAME _____

Instructions: **Show work for partial credit.** If you run out of time outline the procedure without doing the calculations.

1. To determine the daily need for personnel, a manager at an amusement park collect data over a period of time and fits the following model:

$$y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + e,$$

where y = daily admissions, $x_1 = 1$ if weekend, 0 otherwise, $x_2 = 1$ if sunny, 0 otherwise, and x_3 = predicted daily high temperature.

With 50 days worth of data, the estimated model is:

$$\hat{y} = -103.3 + 414.3x_1 + 201.2x_2 + 29.63x_3,$$

with standard errors of the coefficients of 80.3, 48.95 and 9.21, respectively. Also $R^2 = .64$

- a) Is there evidence that this model is any good for predicting admissions? Justify your answer (10 p)

b) Interpret the value of the coefficients (5 p)

c) Is there evidence that attendance increases on weekends? By how much? (5 p)

d) Use the model to predict the attendance for a cloudy saturday with a predicted high temperature of 85 degrees. (5 p)

2. A limousine service wants to determine the length of time that it takes to transport passengers from various locations to a major metropolitan airport in nonpeak times. A sample of 20 trips on a particular day indicated the following:

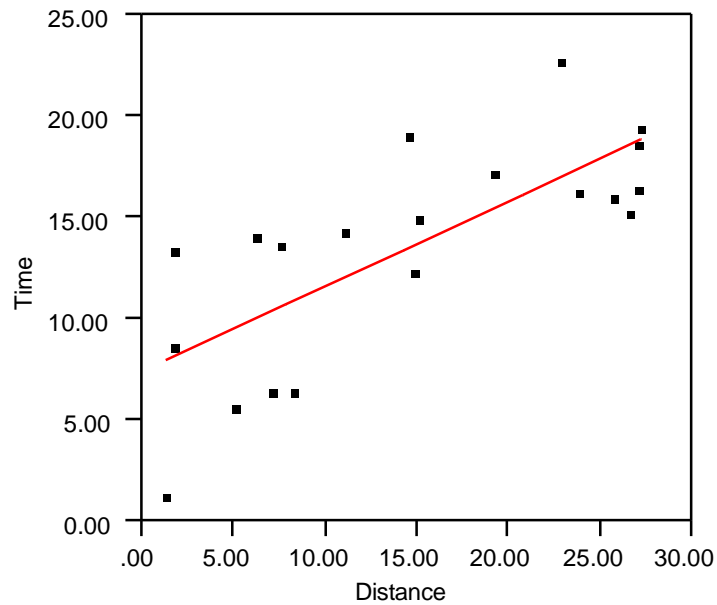
Distance (miles)	Time (minutes)
5.18	5.64
27.16	18.58
11.20	14.34
7.26	6.41
25.80	15.93
27.14	16.39
15.20	14.96
14.89	12.24
1.39	1.30
1.86	8.66
22.94	22.69
14.67	19.03
23.90	16.28
1.88	13.40
26.80	15.17
8.32	6.37
7.63	13.63
19.32	17.23
27.35	19.37
6.34	14.05

The results of the analysis are given in the next page.

a) Give three practical reasons why the time is not determined solely by the distance. (5 p)

b) Interpret in the context of the problem the value of the slope. (5 p)

Time By Distance



— Linear Fit

Linear Fit

Time = 7.36718 + 0.41971 Distance

Summary of Fit

RSquare	0.552897
RSquare Adj	0.528058
Root Mean Square Error	3.709098
Mean of Response	13.58391
Observations (or Sum Wgts)	20

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	306.22925	306.229	22.2592
Error	18	247.63340	13.757	Prob>F
C Total	19	553.86266		0.0002

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob> t
Intercept	7.3671769	1.556961	4.73	0.0002
Distance	0.4197097	0.08896	4.72	0.0002

c) Suppose a passenger lives 9 miles from the airport and needs to be at the airport by 10:00 am. At what time does he need to be picked up so that the probability that the passenger won't be late is 0.95? (10 p)

d) The president of the company took a course in statistics in college and suggests to fit a no intercept model. Give your advice.(5 p)

3. Label each of the following statements as TRUE, or FALSE. Justify your answer (5 p each)

a) Sometimes, when a new regressor is added to a model, the coefficient of determination decreases.

b) When an observation is deleted from a model, the coefficient of determination necessarily increases. [Hint: Draw pictures]