Practice exercises for CH10 and CH11:

Q1: A certain HMO is attempting to show the benefits of managed health care to an insurance company. The HMO believes that certain types of doctors are more cost-effective than others. One theory is that primary specialty is an important factor in measuring the cost-effectiveness of physicians. To investigate this, the HMO obtained independent random samples of 26 HMO physicians from each of four primary specialties-- General Practice (GP), Internal Medicine (IM), Pediatrics (PED), and Family Physician (FP)-- and recorded the total per-member, per-month charges for each. Identify the experiment unit, treatments, block and response variable for this study.

Q2. Exercise: Below is an incomplete ANOVA table for CRD.

Source	df	SS	MS	F
Diet	2			
Error		52.3		
Total	25	156.7		

1. Complete ANOVA table.
2. How many treatments are involved in this experiment?
3. How much is the MSE?
4. How much is the F test statistic used to compare the treatment means?
5. Write down the rejection region for hypothesis test of treatment means.
6. Conduct a hypothesis test to compare the treatment means. ($\alpha = 0.05$)

Q3. Exercise: Below is an incomplete ANOVA table for RBD.

source	df	SS	MS	F
Drug(treatment)	2	329		
Patient(block)	9	1207		
Error				
Total	29	1591		

1. Complete ANOVA table.
2. How many treatments are involved in this experiment?
3. How many blocks are involved in this experiment?
4. How much is the MSE?
5. How much is the F test statistic used to compare drug means?
6. How much is the F test statistic used to compare patient means?
7. Write down the rejection region of hypothesis test to compare drug means.
8. Write down the rejection region of hypothesis test to compare patient means.
9. Conduct a hypothesis test to compare the treatment means. ($\alpha = 0.05$)

Q4. multiple comparisons of means. (SPSS output: Post Hoc Test)

means :	13.0	17.3	32.3
State:	AL	UT	CAL

Question: 1. How many pair-wise comparisons of means (μ_i, μ_j) are there?

2. List those pairs of means which are sig. different.

3. List those pairs of means which are not sig. different.

Multiple Comparisons

Dependent Variable: numrigs

Bonferroni

(I) state	(J) state	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
AL	CAL	-19.33*	2.325	.003	-28.54	-10.12
	UT	-4.33	2.325	.408	-13.54	4.88
CAL	AL	19.33*	2.325	.003	10.12	28.54
	UT	15.00*	2.325	.009	5.79	24.21
UT	AL	4.33	2.325	.408	-4.88	13.54
	CAL	-15.00*	2.325	.009	-24.21	-5.79

Based on observed means.

*. The mean difference is significant at the .05 level.

Q5. ANOVA Table for a $a \times b$ factorial experiment in CRD:

Source	df	SS	MS	F
C. Model	a*b-1	SST	MST=SST/(ab-1)	MST/MSE
A	a-1	SSA	MSA=SSA/(a-1)	MSA/MSE
B	b-1	SSB	MSB=SSB/(b-1)	MSB/MSE
A*B	(a-1)(b-1)	SS(AB)	MSAB=SS(AB)/(a-1)(b-1)	MSAB/MSE
ERROR	n-ab	SSE	MSE=SSE/(n-ab)	
C. Total	n-1	SS(Total)		

Procedure for ordered-F tests.

Complete the ANOVA table:

Source	df	SS	MS	F
A	3		0.75	
B	1	0.95		
A*B			0.30	
Error				
C. Total	23	6.5		

1. give the number of levels for each factor.

2. How much is the value of test statistic to compare treatment means?

Q6: Do the simple linear regression analysis for the following data. (FIREDAM)

x (miles): the distance of a fire from the nearest fire station;

y (thousand dollars): fire damage

x	3.4	1.8	4.6	2.3	3.1	5.5	0.7	3.0	2.6	4.3	2.1	1.1	6.1	4.8	3.8
y	26.2	17.8	31.3	23.1	27.5	36.0	14.1	22.3	19.6	31.3	24.0	17.3	43.2	36.4	26.1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	841.766	1	841.766	156.886	.000[a]
	Residual	69.751	13	5.365		
	Total	911.517	14			

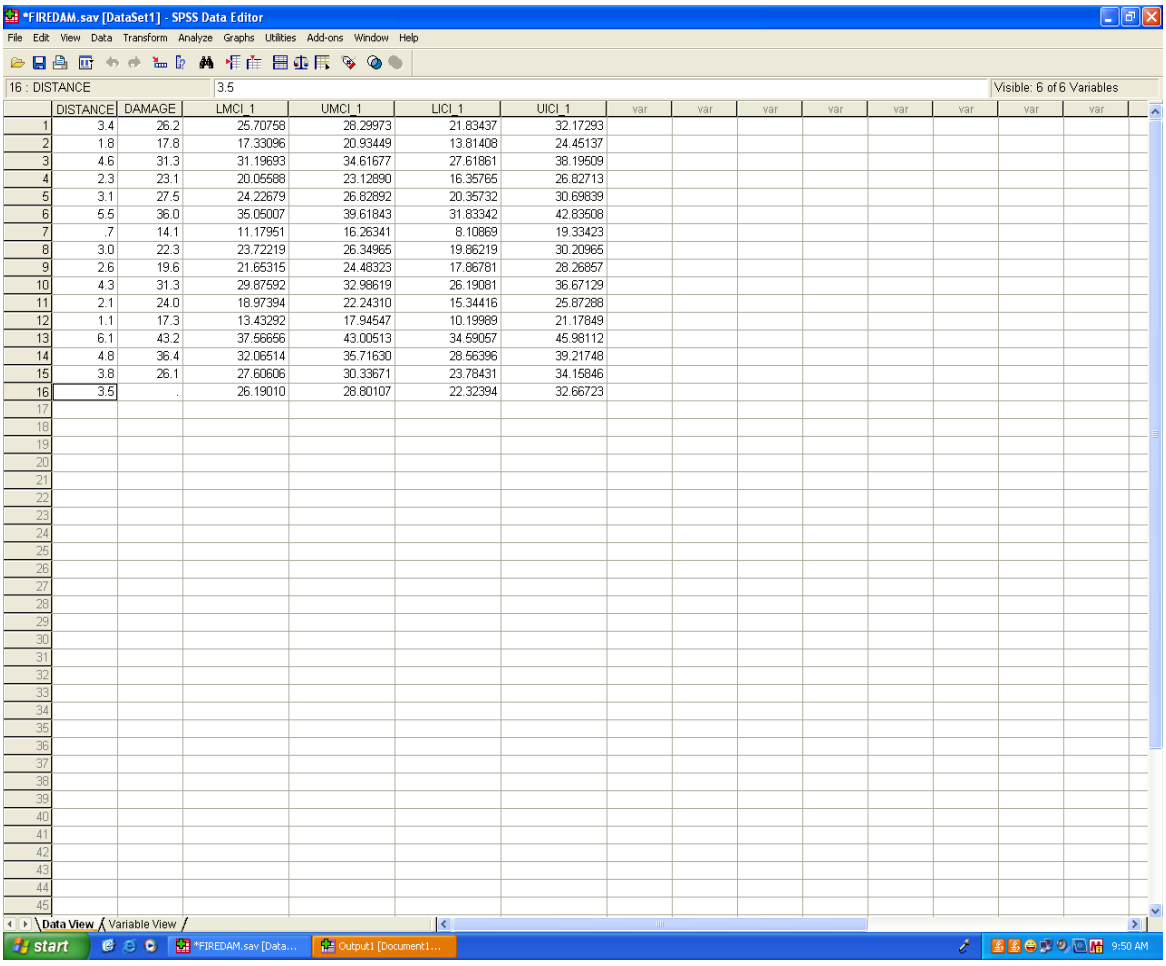
a. Predictors: (Constant), DISTANCE

b. Dependent Variable: DAMAGE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.278	1.420		7.237	.000
	DISTANCE	4.919	.393	.961	12.525	.000

a. Dependent Variable: DAMAGE



1. Write down the least squares line regression equation.

2. Give a practical interpretation for estimated slope and estimated intercept.

3. Give an estimate of the standard deviation σ .

4. Conduct a test to determine if the data provide evidence that the distance and the damage have positive linear relationship? Use $\alpha = 0.05$.

5. Construct a 95% confidence interval for β_1 and interpret the result.

6. Find the coefficient of correlation r and give an interpretation.

7. Calculate the coefficient of determination r^2 and give an interpretation.

8. Suppose the insurance company wants to predict the fire damage if a major residential fire was to occur 3.5 miles from the nearest fire station. Find the prediction interval and give an interpretation.

9. Suppose the insurance company wants to estimate the mean fire damage for all the possible residential fires which were to occur 3.5 miles from the nearest fire station. Find the confidence interval and give an interpretation.