Self-Assessment

Weeks 6 and 7: Multiple Regression with a Qualitative Predictor; Multiple Comparisons

1. Suppose we wish to assess the impact of five treatments on an outcome Y. How would these five treatments be coded as dummy variables? Present actual data to illustrate the coding.

2. Below is a regression analysis with two variables:

Heart rate = beats per minute

Blood Pressure Medication = four drugs prescriptions (Losartan, Ziac, Lisinopril [12.5mg], and Lisinopril [40mg])

Dummy variables were created for Ziac, Lisinopril 12.5, and Lisinopril 40.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.741(a)	.550	.531	4.75098

a Predictors: (Constant), lisinopril_40, lisinopril_12_5, ziac

ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1982.987	3	660.996	29.284	.000(a)
	Residual	1625.171	72	22.572		
	Total	3608.158	75			

a Predictors: (Constant), lisinopril_40, lisinopril_12_5, ziac
b Dependent Variable: heart_rate

Coefficients(a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	61.714	1.037		59.527	.000
	ziac	-12.597	1.550	-.762	-8.127	.000
	lisinopril_12_5	-1.067	1.550	-.065	-.689	.493
	lisinopril_40	-.190	1.466	-.012	-.130	.897

a Dependent Variable: heart_rate

Coefficients(a)

Model		95% Confidence Interval for B	
		Lower Bound	Upper Bound
1	(Constant)	59.648	63.781
	ziac	-15.687	-9.507
	lisinopril_12_5	-4.157	2.023
	lisinopril_40	-3.113	2.732

a Dependent Variable: heart_rate

(a) Overall does it appear heart rate differs by blood pressure medication at the .05 level? Explain how you arrived at an answer for this question.

(b) Provide literal interpretations for each of the four unstandardized regression coefficients presented in the coefficients table.

(c) What is the predicted mean heart rate for someone taking Lisinopril 40? For someone taking Ziac?

(d) Which regression coefficients are statistically significant at the .05 level for the dummy variables?

(e) Write a very brief, one sentence interpretation for each dummy variable coefficient in the SPSS coefficients table above. Take into account significance testing with an alpha = .05.

 (f) Model R^2 = .55 – what does this tell us?

(g) What is the predicted mean heart rate difference between Ziac and Lisinopril 12.5?

(h) What is the interpretation for the 95% confidence interval for b3 (Lisin 40 dummy)?

3. If one wishes to compare Y across five treatments, and the per comparison alpha = .10,

(a) how many pairwise comparisons are possible, and

(b) what would be the familywise error rate?

(c) Interpret the familywise error rate calculated in (b) above.

4. Question 2 above presented SPSS results for heart rate compared across four drug prescriptions. The per comparison alpha was set at .05. The number of observations for the study is 76.

(a) There are six possible pairwise comparisons among the four drug prescriptions. This means there are six different confidence intervals that could be computed. Use a familywise error rate of .05 when considering these comparisons. Based upon this information, calculate and present the Bonferroni confidence interval for the Ziac vs. Losartan comparison.

(b) Using the same information presented in (a), construct and present a Scheffé confidence interval for the Ziac vs. Losartan comparison.

5. Below is a data file containing the following variables for cars taken between 1970 and 1982:

mpg:	miles per gallon
engine:	engine displacement in cubic inches
horse:	horsepower
weight:	vehicle weight in pounds
accel:	time to accelerate from 0 to 60 mph in seconds
year:	model year (70 = 1970, to 82 = 1982)
origin:	country of origin (1=American, 2=Europe, 3=Japan)
cylinder:	number of cylinders

SPSS Data: http://www.bwgriffin.com/gsu/courses/edur8132/selfassessments/Week04/cars_missing_deleted.sav

(Note: There are underscore marks between words in the SPSS data file name.)

Other Data Format: If you prefer a data file format other than SPSS, let me know.

For this problem we wish to know whether MPG differs among car origins:

Predicted MPG = b0 + origin of car with appropriate dummy variables

Present an APA styled regression analysis with DV = MPG and IV = origin. Set alpha = .01. You will have to create the dummy variables for origins. Also present both the Bonferroni and Scheffé confidence intervals comparing each of the origins.