

Name _____

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Mgt 264b
Regression Analysis with Applications to Marketing and Finance

Problem Set #6

This problem set is designed to reinforce material on the multiple regression model covered in chapter V.

1. An Example of Multiple Regression

Based on 107 student's scores on the first examination in a course on managerial accounting, the following model was estimated

$$y = 2.178 + .469x_1 + 3.369x_2 + 3.054x_3 \quad R^2 = .686$$

(.090) (.456) (1.457)

where y is the actual score

x_1 is the expected score (forecast of student)

x_2 is hrs per week spent studying

x_3 is student GPA

(standard errors are in parentheses)

- a. interpret the estimate of β_1
- b. find a 90% C.I. for β_2
- c. test the hypothesis that $\beta_3 = 0$ at the 5 percent significance level.
- d. Compute the F statistic for the overall significance of the regression.
- e. Draw 2000 draws from an F distribution with 3 (numerator df), 103 (denominator df). Plot the value of the F statistic computed in part d on the histogram of these numbers. You will need to use `rf()`.
- f. Test the overall significance of the regression at the .01 level and report the p-value. You will need to use `qf()` and `pf()`.

2. Review of Differences between Multiple and Simple Regression

To insure that you understand the material on multiple regression in chapter IX, repeat these calculations for the multiple regression coefficient on P2 in the regression of Sales on P1 and P2. That is, use a sequence of *simple* regressions to compute the multiple regression coefficient and standard error.

```
data(multi).
```

3. More on the Multiple Regression Model

Suppose you are given a data set with Y and X1 and X2. You regress Y on X2 and you get a significant coefficient. Then you regress Y on X1 and X2 in a multiple regression and get a small and insignificant coefficient on X2 in the multiple regression. How is this possible?

4. Indirect and Direct Effects in Multiple Regression

`data(zagat_chi_rivernorth_08)`. This dataset has information on average price of a dinner for one (w/o alcohol) and the Zagat ratings on food, décor and service from the on-line Zagat guide and for some 90 odd restaurants in the rivernorth area.

Run a multiple regression of price on the decor and service ratings. Perform residual diagnostics on this regression and comment on these diagnostics

Run a simple regression of price on service rating. Explain why the regression coefficient in this simple regression is larger than in the multiple regression.

Use the results of the multiple regression to decompose the coefficient on the service rating in the simple regression as in Chapter V in the classnotes. There is a “direct” effect of changing the service rating on price as well as an “indirect” effect due to the fact that service and decor ratings are correlated. You will need to perform an auxiliary regression of decor rating on service rating.