

15.060 Data, Models, and Decisions
Homework 3
Due: WEDNESDAY, October 1, 2014

1. The spreadsheet EXEC-PAY.xls contains data on the annual compensation of CEOs of 43 publicly-traded corporations, as well the number of years that the executive has been the CEO of the company, the percentage change in the stock price of the company from the previous year, and the percentage change in the company's sales from the previous year.
 - (a) Download the spreadsheet EXEC-PAY.xls. Then construct and run a regression model to predict the CEO compensation as a function of the three independent variables indicated in the spreadsheet.
 - (b) What is the R^2 of the regression? In your opinion is this value low or high?
 - (c) What is the standard error of the regression?
 - (d) What is the regression equation produced by your linear regression model?
 - (e) What is the predicted CEO compensation for a CEO who has been with her company for 6 years, and for which the company's stock price has increased by 34% in the last year, while the company's sales have decreased by 3% in the last year?
 - (f) Do you notice anything unusual about your regression model that might make you less confident about the validity of the model?

2. The Sloan Café bakes crumpets that are sold only in the afternoons. Suppose Jill Preisig would like to predict the sales of afternoon crumpets in order to improve efficiencies in the baking operation. Jill has collected daily data on sales of afternoon crumpets and has run a regression model with the following independent/explanatory variables:
 - the number of students who park in the Sloan parking lot on the given day
 - the outside temperature, in degrees Fahrenheit, at noon on the given day
 - the number of croissants sold at breakfast in the morning of the given day
 - the number of crumpets sold the previous afternoon of that day
 - the number of cases due in any Core class on that day

Below is the regression model output from Jill's model.

SUMMARY OUTPUT						
<i>Regression Statistics</i>						
Multiple R	0.9685					
R Square	0.9381					
Adjusted R Square	0.9246					
Standard Error	2.3369					
Observations	29					
<i>ANOVA</i>						
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>	
Regression	5	1904.3893	380.8778	69.7408	3.97E-13	
Residual	23	125.6106	5.4613			
Total	28	2030				
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-58.5341	7.3935	-7.9169	5.13E-08	-73.8288	-43.2394
#students	0.36317	0.0957	3.7937	0.0009	0.1651	0.5612
temp	0.0199	0.0431	0.4614	0.6488	-0.0694	0.1092
croissants breakf.	1.2807	0.2866	4.4676	0.0002	0.6877	1.8737
crumpets yester.	0.2503	0.1179	2.1234	0.0546	-0.0064	0.4943
case due	1.3109	0.9161	1.4309	0.1659	-0.5842	3.2062

- (a) What is the regression equation of Jill's model?
- (b) What is the R^2 of Jill's regression? In your opinion is this value low or high?
- (c) According to Jill's model, what is the prediction of daily crumpet sales if 40 students parked in the Sloan lot that day, the temperature is 65°F, the number of croissants sold at breakfast was 40, the number of crumpets sold yesterday was 10, and there was one Core class case due today?

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