

Homework #3 (Due September 24, 3:30 p.m.)
STAT-UB.0003: Regression and Forecasting Models

1. MBS, Ex. 11.27
2. MBS, Ex. 11.58. The problem asks for evidence of a “decrease” (one-sided alternative). We did not cover one-sided alternatives in class. Use a two-sided alternative instead (testing for evidence of “change”.)
3. Financial institutions charge, in general, different interest rates on their loans. A financial analyst was interested in the relationship between Y and X, where

Y = the default rate per 1000 loans (i. e. the number of loans
that default per 1000 loans)

X = the interest rate (%) on a loan.

She collected data on a random sample of financial institutions, that is for each institution in the sample she recorded the interest rate charged by that institution and the number of defaults per 1000 loans given by that institution. Answer the following questions using your own Minitab output. The data are posted on the course website in the DefaultInt data file.

- (a) What is a reasonable population for this dataset?
- (b) Use Minitab to make a scatter plot of the data (*Graph* \Rightarrow *Scatterplot*; choose “Simple”; then set the X and Y variables in row 1 of the table). Does the scatter plot indicate an approximate linear relationship between Y and X?
- (c) Fit a regression model of Y on X (*Stat* \Rightarrow *Regression* \Rightarrow *Regression* \Rightarrow *Fit Regression Model*; use the “Responses” and the “Continuous Predictors” boxes to select that Y and X variables). Interpret the coefficients in the fitted model.
- (d) Explain the meanings of the fitted coefficients ($\hat{\beta}_0$ and $\hat{\beta}_1$) and the true coefficients (β_0 and β_1). How are they different?
- (e) Form a 95% confidence interval for β_1 .
- (f) Find the standard error of regression (s) and interpret it.
- (g) Use *Stat* \Rightarrow *Basic Statistics* \Rightarrow *Display Descriptive Statistics*, then enter the response variable in the “Variables” box. Report the sample standard deviation of the default rates (s_Y). What are the interpretations of s and s_Y ? How are they different?
- (h) Is there a statistically significant linear relationship between Default rate and Interest rate? Test at level $\alpha = 0.01$? (State H_0 and H_a , and your conclusion.)
- (i) What is the meaning of the p-value associated with $\hat{\beta}_1$? (Provide a one-sentence description.)