

STAT 308 – Homework 5

For the problems in which calculations are needed, please include your **R** code with your answers, otherwise you will not be given full credit. Please upload your assignment by Thursday, October 20, 11:59 pm in a pdf file to Sakai.

- 1. Consider the **r** dataset **X.rds**, which contains a 60×4 matrix of predictors and **y.rds** which contains a 60×1 vector of observed responses.

To load an **.RDS** file into **R**, use the function **readRDS** instead of **read.csv**

- a. State the least squares regression line in the form $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \hat{\beta}_3 x_3$
- b. What is the sum of squared errors of the least squares regression line?
- c. What is the estimated regression variance?
- d. What is the estimate of the standard error for β_1 ?

2. Consider the dataset **economy.csv** which contains the following variables:

- **CRUDE**: dollars per barrel of crude oil
- **INTEREST**: interest on ten-year treasury notes
- **FOREIGN**: foreign investments in billions of dollars
- **DJIA**: Dow Jones industrial average
- **GNP**: Gross national product in billions of dollars
- **PURCHASE**: Purchasing power of U.S. dollar (in 1983 dollars)
- **CONSUMER**: Consumer debt in billions of dollars

Suppose we wish to create a linear model for crude oil price based on the other six variables in the dataset.

- a. State the least squares regression line for this linear model.
- b. Interpret the parameter associated with the variable **FOREIGN** in the context of the problem.
- c. Interpret the parameter associated with the variable **DJIA** in the context of the problem.
- d. What are the error degrees of freedom for this linear model?
- e. What is the estimate of the regression variance?
- f. What are the sum of squared errors?
- g. State the value of r^2 and interpret this value in the context of the problem.