

Math 5364 Homework 27

1. The data set `math5305Lab6Data.txt` contains four columns, Y , X_1 , X_2 , and X_3 , respectively. Perform the following using SAS.

- (a) Fit the multiple regression model

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \epsilon_i.$$

- (b) What are the estimates $\hat{\beta}_1$, $\hat{\beta}_2$, and $\hat{\beta}_3$?
- (c) Find the t -statistic and corresponding p -value for each of the three variables X_1 , X_2 , and X_3 .
- (d) Find an appropriate test statistic and p -value for testing $H_0 : \beta_1 = \beta_2 = \beta_3 = 0$.
- (e) Find R^2 for this model.
- (f) Investigate normality of the residuals for this model using a qq-plot and the Shapiro-Wilk test.
- (g) Use the `/SPEC` option to assess homoscedasticity of the residuals.
- (h) Recall that e is the vector of residuals and \hat{Y} is the vector of predicted values. Produce the following plots
- Y vs. X_j , $j = 1, 2, 3$
 - Y vs. \hat{Y}
 - e vs. X_j , $j = 1, 2, 3$
 - e vs. \hat{Y}
- (i) Overall, do the typical linear regression model assumptions appear to hold for this model?