MTH 441A: Lab 3

P 1. Consider the data $y = (1, 4, 8, 9, 3, 8, 9)$, $x_1 = (-1, 1, -1, 1, 0, 0, 0)$, $x_2 = (-1, -1, 1, 1, 0, 1, 2)$. Let the following regression model is used:

$$\mathbb{E}(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1^2$$

Test the hypothesis $H_0 : \beta_0 = 0, \ \beta_1 - \beta_2 = 0$. You may use *'linearHypothesis'* function from **carData** package to verify your answer.

P 2. Consider the data set and the model from **P 1.** Consider the following null hypothesis $H_0 : \beta_1 = \beta_2 = \beta_3 = 0$.

   (a) Compute the restricted LSE under the null hypothesis.

   (b) Compute the restricted RSS and unrestricted RSS.

   (c) Compute the F–statistics for testing H_0.

   (d) Verify your results from the output of lm function.

P 3. Consider the following data

Table 1: Lack of fit data

x	1.0	1.0	2.0	3.3	3.3	4.0	4.0	4.0	4.7	5.0	5.6
y	10.84	9.30	16.35	22.88	24.35	24.56	25.86	29.16	24. 59	22.25	25.90
x	5.6	5.6	6.0	6.0	6.5	6.9					
y	27.20	25.61	25.45	26.56	21.03	21.46					

Perform a lack–of–test for the data given in the Table above. You may use *'ols_pure_error_anova'* function from the package **olsrr**.

P 4. For the Rocket Propellant Data, find the confidence intervals of the parameters based on

   (a) Bonferroni method

   (b) Maximum–modulus method

   (c) Scheff's method.