WST 311

Assignment H: 16-20 April 2018

Part 1: Estimation

Exercise 7.54.

Answer questions (a) to (e)

Part 2: Test of Hypotheses

Continue with Exercise 7.54 and answer the following questions. Use a 5% level of significance.

Consider the two models:

Model 1: $y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$

Model 2: $y_1 = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_1^2 + \beta_5 x_2^2 + \beta_6 x_3^2 + \beta_7 x_1 x_2 + \beta_8 x_1 x_3 + \beta_9 x_2 x_3 + \varepsilon$

1. Test for the overall significance of the Model 1. That is, test $H_0 : \beta_1 = \beta_2 = \beta_3 = 0$.

2. For Model 1: Test $H_0 : \beta_i = 0$ for $i = 1, 2, 3$.

3. For Model 1: Test $H_0 : 2\beta_1 = 2\beta_2 = \beta_3$.

4. Consider the PROC REG or PROC GLM output from the second model. What can jou say about the overall significance of the model? Comment on the additional significance of each independent variable to the model given that the other independent variables are already in the model.

To create functions of the independent variables, say x_1^2, x_2^2 and x_3^2, the following syntax in SAS can be used:

```
data chemical;
input y1 x1 x2 x3;
x1x1=x1*x1;
x2x2=x2*x2;
x3x3=x3*x3;
cards;
41.5 162 23 3
33.8 162 23 8
:
;
```

Alternatively, if the data has already been entered into the dataset chemical, the following syntax in SAS can be used:

```
data chem2;
set chemical;
x1x1=x1*x1;
x2x2=x2*x2;
x3x3=x3*x3;
```