TAMS 65 Assignment 2
Multiple linear regression - Polynomial Regression

This assignment deals with multiple linear regression as well as Polynomial Regression.

Instruction

- You are recommended to use software MATLAB to answer questions.
- Attach the project in **pdf file** and name it as **Project.pdf**.
- Make a detailed report on **2 assignments**.
- Give only solutions to the rest of **5 assignments**. Note: I have marked this part of questions in **blue**. That is, you only need to show solutions to the blue part of questions for the rest of 5 assignments.
- **Submit first version** of your report to your **teaching assistants** not later than May 1, 2020.
- **Submit final version** of your report to the lisam: **Lisam - Submissions**.
- **Deadline** for submissions is at 23:00 May 15, 2020. Note: The submission entrance will open at 0:00 May 7, 2020.
- **All codes** that you will need are given either in Lectures or 7 assignments.

Polynomial Regression

In a new method of electric welding, we want to investigate how the current is important for the strength of the weld joint. Let

$$\begin{aligned} y &= \text{measure of the strength of the weld joint ,} \\ z &= \text{current during welding.} \end{aligned}$$

Furthermore, we encode the current according to

$$x = \frac{z - 5000}{1000}.$$

Now you analyze the data using polynomial regression of various degrees.

Download and open the file **Assignment2.m**, then run it. Input the codes in the **Command Window** or **Editor** window.

Questions

(a) First, you consider observations for $x > 0.5$, that is, current $z > 5500$. You can get the data in this way. You copy the observations for $x > 0.5$ in **Editor** window, use the code in **Editor** window to create new response variable $y1$ and explanatory variable $x1$. Scatter plot $y1$ against x_1. Can you see any obvious pattern in the plot?

(b) Give a suitable linear regression model with response variable $y1$ and explanatory variable $x1$. Calculate the coefficient of determination R^2. Are you happy with this value?

(c) Do a residual plot with observations, and compare it with $y1$ - $x1$ plot. Suggest a suitable linear regression model based on the model in (b), and calculate the coefficient of determination R^2. Are you happy with this value? You may need the following code:

```
x12=x1.*x1
```

(d) Now, you consider all observations. Scatter plot y against x. Can you see any obvious pattern in the plot? Give a suitable linear regression model and calculate the coefficient of determination R^2. Are you happy with this value? You may need the following code:

```
x2=x.*x.*x
x3=x.*x.*x
```

(e) Calculate the stationary points for the strength, and state at intervals what strength we can expect for these currents.