Problem Set 1

Applied Stats II

Due: February 11, 2024

1 Answer to Question 1

Kolmogorov-Smirnov test: First, I wrote a function. The input of the function is 'data' which is given by the codes in the question itself. The function itself is supposed to see if the distribution of the given set of data has the same distribution as normal. For this, I need to compare the distributions by considering two criteria: Firstly, the distance (D) of these two distributions and secondly, the p-value to see if they are statistically, significantly different. I used the function by feeding the data to the function. The output of this function is as follows: 1: from the p value which is less than 0.05 we can conclude that the null hypothesize

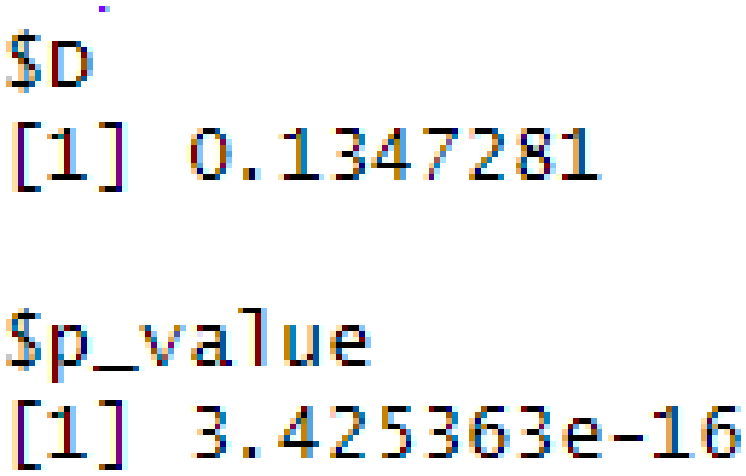

Figure 1:

is rejected and the distributions are the same.

Answer to Question 2

For this question, I need to compare the result of OLS linear and Newton-Ralphson methods together. First, I ran OLS by using the lm() function in R. and for the Newton-Ralphson

method I first plotted the data given in the question. The plot is shown in figure 2. As shown in figure 2, the line intersects with the x-axis in approximately (0,0). Thus, my initial parameter point is (0,0). Each time, I put the x equal to the initial guess and find the new x from the following formula 3, until I get the minimum error. After applying both methods to the dataset, I got the intercept and slope for OLS and Newton-Ralphson, respectively (0.1392, 2.7269) and (0.1391, 2.726) which are approximately equal. and the slope is the same as the number given by the question itself.

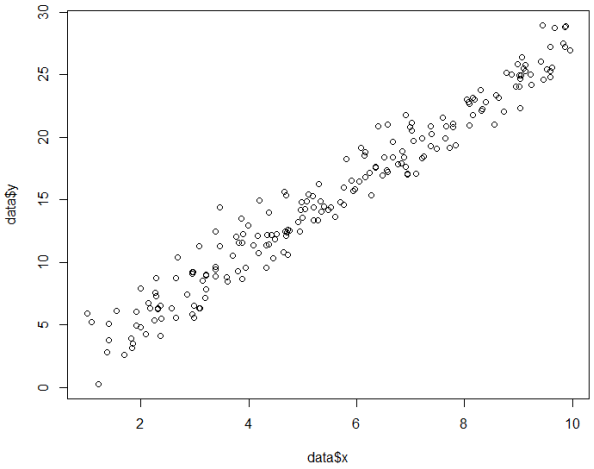

Figure 2:

$$x_1 = x_0 - f(x_0)/\, f'(x_0)$$

Figure 3: