Assignment 2

Background

A research team has conducted a study to investigate the influence of different variables on reaction times, i.e. a person's age and gender, which hand they usually use to perform a task, and how frequent a person carried out physical activities. Data were collected from a town containing about 18000 people.

In this assignment, you are given a set of sample data in an Excel file. This file contains a sample of 100 people chosen from the town. Answer all questions by referring to your assigned sample data. You must use R to answer the question whenever appropriate. Ensure full label for all plots that you have included in your answer.

1) The researcher believes that the average reaction time of all citizen in this town is 0.28 seconds.
   a) Calculate a 95% confidence interval for the average reaction time.
   b) Do you agree with the researcher? Justify your answer based on your confidence interval in part (a).
   c) Calculate the sample size if we want to be 90% confident that the estimate of population mean is off by at most 0.05. [6 marks]

2) Is there a different in the reaction time for left-handed and right-handed citizen on average? You should
   a) Explore the data with appropriate plot. Comment on your plot and answer the question.
   b) Calculate an appropriate confidence interval to determine if left-handed and right-handed citizen have different variability in their reaction time. Use a 97% confidence level. You must write all the steps clearly
   c) Construct an appropriate hypothesis test to determine if there a different in the reaction time for left-handed and right-handed citizen on average. Use a 3% level of significance. You must write all the steps clearly. [18 marks]

3) The researcher wants to build a regression model for respond time, with the other 4 variables in the dataset as explanatory variables.
   a) Construct a linear regression model for respond time on the 4 variables and write your model.
   b) How is the reaction time change for an additional of 10 years in age? Show all the steps of your calculation.
   c) Test the significance of your model with the ANOVA approach. You must write all the steps clearly.
   d) Verify if the linear regression model is appropriate for your dataset. You must justify your answer based on appropriate plot. [11 marks]