DUE: February 8th, 2019 at 11:59 PM

QMM 1002 Module 4 Assignment /38

Create and submit an R script which, when run, will print the answers to the following questions. Your R script must include a title with your name and student number and comments for each question number.

1. **(4 marks)** In each situation should the data be treated as independent or paired samples? Explain in your own words.

   a) A professor would like to know whether an introductory background module in statistics will improve student performance on a diagnostic test. Students write a diagnostic test, study the module, and then write a second diagnostic test (of similar difficulty).

   b) A real estate agent would like to know if the average price of a home differs between Chelmsford and Azilda. The real estate agent randomly selects 20 for-sale homes from each location to test his hypothesis.

2. **(17 marks)** The production manager at Bellevue Steel, a manufacturer of wheelchairs, wants to compare the number of defective wheelchairs produced on the day shift with the number produced on the afternoon shift. A sample of the production from six day shifts and eight afternoon shifts revealed the following number of defects:

Day	5	8	7	6	9	7		
Afternoon	8	10	7	11	9	12	14	9

   Is there a difference in the mean number of defects per shift? Use $\alpha = 0.01$.

   a) State the null and alternative hypotheses.

   b) Perform the pooled t-test assuming the homogeneity of variances. State the t test statistic and p-value.

   c) Determine the critical value.

   d) Should the null hypothesis be rejected? Interpret your results.

   e) Perform the two-sample t-test. State the t test statistic and p-value.

   f) Is there a difference in your decision for the two tests? Do you think the homogeneity of variance assumption is appropriate? Explain.

DUE: February 8th, 2019 at 11:59 PM

3. **(17 marks)** The managers of a large number of stores claim that despite relatively constant sales, profits this year are greater than last year. They have achieved this by improving their supply chain and distribution operations. Read in the *Store.Profit* dataset that gives the sales and profits over two years for 15 randomly selected stores and answer the following questions. Use an alpha level of 0.05 throughout.

   a) Do the data support the claim that sales have been constant over the past two years? Choose and perform the appropriate test, check the assumptions, and interpret your results.

   b) Do the data support the claim that profits are higher in year two compared to year one? Choose and perform the appropriate test, check the assumptions, and interpret your results.

   c) Create a grouped bar graph that shows the year one profit, year two profit, and difference between these values for each store. Give your plot an appropriate title and axis labels. (HINT: you will have to reformat the data)

Save your R Script as: Last Name, First Name Module 4 Assignment

Upload your R Script to the "Module 4 Assignment" drop box on Moodle before February 8th at 11:59 PM.