Diploma in Information Technology
Business Statistic with Python
Instructions for CA3 Individual Assignment
October 2022 Semester

Continual Assessment 3 Individual Assignment (40%)
The objective of this assignment is for students to apply statistical concepts on real-world data and write a report on their observation. Students must ensure that their observation is supported by valid sources.

This assignment will make use of what you have learnt in:
•Organising and Visualising Variables
•Numerical Descriptive Measures
•Use of Statistical Software for Data Analysis (Microsoft Excel)
•Hypothesis Tests
•Simple Linear Regression and Correlation Coefficient

Task 1

Read the following article on "**National Day Rally 2022**"

https://www.pmo.gov.sg/Newsroom/National-Day-Rally-2022-English

What are Three (3) achievements Singapore had made in the recent years and describe, in your view, the geo-political and economic challenges facing a small nation like Singapore. Suggest 2-3 ways what the leaders of Singapore should do to maintain her position in the Asia in the next decade.

DELIVERABLE – TASK 1

Conduct online research relating to the achievements made by Singapore and challenges. Your report should not be longer than 2 pages.

Task 2
Refer to Workforce_Earning-Data.xlsx

Problem Description:

Although Singapore have taken huge steps in attracting foreign workers to fill the labor gap in the last 10 years, there are beliefs that foreign workers received higher salary than local Singaporeans of equal demographic profile and educational/professional qualification. This may potentially create an impression that Singapore's economic progression is at the expense of young Singaporeans' aspirations. However, introducing more labor rules such as imposing wage ceiling on foreign workers in Singapore may drive away foreign talents that Singapore needs to ensure her long term survival.

You have been appointed by the Secretary-General of the National Trades Union Congress (NTUC) as the chairman of the the *Employment and Pay Equity Taskforce* to analyze the severity of pay gap, if any, in Singapore using the **5%** significance level. The data in this study are drawn from the March 2022 quarterly report. The sample used for analysis comprises of **968 full-time workers in the age group 25-60.** The dataset contains the following information:

1. <u>Salary</u>: monthly salary in Singapore dollars of full-time workers.
2. <u>Gender</u>**:** M= Male, F=Female.
3. <u>Working Pass</u>: E=Employment Pass(EP), O=Other pass (e.g. Work Permit or S-pass)
4. <u>Age:</u> Current age.
5. <u>Educ_Level:</u> D=Degree or higher**, L**= Lower than degree.
6. <u>Experience:</u> number of years of relevant past work experience.

Using the tools you have learned in Business Statistics with Python (BSP), provide the Secretary-General of the union with the findings of your analysis of the pay gap. You may assume he has a good understanding of basic statistics.

(a) By using Excel, calculate key summary descriptive statistics for the **monthly salary** of three (3) types of workers - Singaporeans, EP-holders, and other work pass-holders**.** Tabulate and interpret the summary statistics. Your comments should focus on the data spread, locality and shape of the data. (6 marks)

(b) Draw a histogram of the monthly salary for the three (3) types of workers - Singaporeans, EP-holders, and other work pass-holders. Interpret the graphs. [Hint: use "bins" carefully.] (6 marks)

(c) Discrimination in the labor market occurs when individuals with identical labor market characteristics receive different remunerations. Can you find evidence of discrimination on the basis of (1) education (2) gender (3) experience between Singaporeans vis-a-viz EP-holders?? Aid your answer with appropriate tables/graphs (Hint: use "bivariate/multivariate analysis".) (8 marks)

(d) Construct and interpret a 95% confidence interval around the mean salary of Singaporean and EP-holders. Clearly indicate any assumptions made. (4 marks)

(e) A media report claims that the mean monthly salary of Singaporean was S\$ 7,900. Do you agree? Use Excel 'Data Analysis' features to perform a hypothesis test at the 5% significance level. Clearly label your diagram and indicate any assumptions made. Explain carefully any potential error you could commit in your decision making. (6 marks)

(f) The sample data seems to suggest that monthly salary of Singaporean and EP-holders is significantly different. In order to reassure yourself, use (1) Excel 'Data Analysis' features (2) Manual calculation method to examine if the **population mean monthly salary** are different between EP-holders and Singaporean workers. Clearly indicate any assumptions made. (8 marks)

(g) Construct a multiple linear regression model and predict the monthly salary of Mary (38 y.o.) who holds an Employment Pass and works as a scientist at A*STAR for 11 years. (12 marks)

(h) Lastly, you need to present your key findings, in Part 3, of your analysis to the Secretary-General of the National Trades Union Congress (NTUC). (25 marks)

DELIVERABLE – TASK 2

Part 1 Excel Analysis

This part of your assignment will require the use of Microsoft Excel. Your working steps should be carefully organized using worksheet for each question supporting your reports in Part 2.

Part 2 Professional Report

Write a report answering the above questions, in sequence. You may need to snip/crop certain relevant results/output from your Excel workbook and incorporate them into your report. The Report needs to be standalone. Do NOT make reference to the Excel workbook within the Professional report.

Your written professional report should comply with the following presentation standards:
1. Typed using a standard professional font type (e.g. Times Roman), 12-point font size.
2. 1.5-line spacing, numbered pages, and clear use of titles and section headings.
3. Checked for spelling, typographical and grammatical errors. Where relevant, round to 3 decimal places, except for currency (e.g. $35.56) and percentage (e.g. 26.75%).
5. With all relevant tables and charts, the report should be no more than 9 pages long, excluding cover page, reference list.

Part 3 Presentation

This portion comprises of 2 components: (a) ppt slides (b) mp4 video presentation.

Oral Presentation based on Power point slides (max=10 slides).

Perform an individual oral presentation (max = 7 mins) of your answers in Task 2 Part 2 Record your oral presentation and upload onto Canvas as *.ppt and *.mp4, briefly explaining the highlight of your analysis, findings and conclusions. Note the following:

1. *Your attire should be at least a smart casual.*
2. *Pay special attention to your background noise and "wall". They should ideally not be distracting or steal the limelight from your presentation.*
3. *You need to upload and submit your power point slides and video onto Canvas.*

IMPORTANT NOTE

1. Deadline = 11 November 2022, 11.59am.

2. Only one time submission is allowed. You are required to submit/upload the following documents onto Canvas in the following sequence:

   Excel Analysis - *.xls => Task 2 Part 1
   Prefessional Report - *. Docs => Task 1 + Task 2 Part 2
   Presentation - *.ppt + *.mp4=> Task 2 Part 3

3. The structure of your MS-Word report must include:
   1] Cover Page comprising of:
      a) Institution name (and institution logo) of this programme
      b) Module name, semester and year
      c) Date of submission
      d) Student's name and student ID number

   2] Task 1 report

   3] Task 2(Part 2) report
      a) An Executive Summary,
      b) An Introduction,
      c) Analysis by questions
      d) Conclusions.

   4] Reference List

4. The references should be presented in Harvard format and should have at least THREE (3) references.

Report Word Limit
Combined Task 1 and Task 2: Max = 1500 to 2000 words

Penalty Marks for Late Submission
By one day: 20% to be deducted from total marks.
More than one day: submission will NOT be graded.

Lecturer Contact
You should contact your lecturer via your SIM email whenever you have any issue about your project.

S/N	Criteria	Excellent	Very good	Good	Acceptable	Weak
1	Understanding of the Assignment (5%)	Student has interesting, logical, reasonable and non-obvious interpretation of the assignment and the assigned reading.	Student has logical, reasonable and non-obvious interpretation of the assignment and the assigned reading.	Student has logical and reasonable interpretation of the assignment and the assigned reading.	Student has logical interpretation of the assignment and the assigned reading.	Student has weak interpretation of the assignment and the assigned reading.
2	Understanding of course concepts (5%)	Student has demonstrated high level of understanding of the course concepts that are both covered in the course syllabus and those not in the scope of the course syllabus	Student has demonstrated an understanding of the course concepts that are both covered in the course syllabus and not in the scope of the course syllabus	Student has demonstrated high level of understanding of the course concepts that are covered in the course syllabus	Student has demonstrated basic understanding of the course concepts that are covered in the course syllabus	Student has not demonstrated sufficient understanding of the course concepts that are covered in the course syllabus
3	Task 1 (10%)	Student has a clear understanding of the question requirements and is able to produce clear and accurate description supported by summary statistics and relevant charts effectively.	Student has a clear understanding of the question requirements and is able to produce clear description supported by summary statistics and relevant charts effectively.	Student has a clear understanding of the question requirements and is able to produce suitable description supported by some government's statistics and charts.	Student has a reasonable understanding of the question requirements and can produce description supported by a few government's statistics data and charts.	Student do not have a clear understanding of the question requirements. Lack of clear description. Do not have sufficient summary statistics to support answers.
4	Task 2 (50%)	Student has a clear	Student has a clear	Student has a clear	Student has an acceptable	Student do not have a

		understanding of the question requirements and can provide answers with clear and coherent explanations and comments.	understanding of the question requirements and can provide most of the answers with clear and coherent explanations and comments.	understanding of the question requirements and can provide correct answers. Explanation could be improved with better and clearer working steps and comments.	level of understanding of the question requirements and can provide correct answers. For most of the questions. Explanation could be improved with better and clearer working steps and comments.	clear understanding for most of the question requirements. Lack of clear description.
5	Referencing (5%)	Student has used more than sufficient referencing and practiced appropriate referencing and citations style	Student has used sufficient referencing and practiced appropriate referencing and citations style	Student has used some referencing and practiced citations style with some minor errors	Student has used limited referencing	Student has used less than satisfactory amount of referencing
6	Oral presentation (25 marks)	An excellent presentation with clear flow and strong command of oral English coupled with well-illustrated and content rich slides. Could handle questions very well.	A presentation with good oral English and sufficient content on the slides.	A reasonable presentation with sufficient content, though some aspects of the oral English could improve.	Student presented in much less time than allocated; poorly organized and illustrated slides. Oral English could improve	Student **did not** present.