**Assignment Description**

Students are required to produce an individual assignment using data provided. Data is available on BB108 Moodle shell. You need to use Business Statistics theory, concepts, tools and terminology that you have learnt from weeks 1 to 8 to analyse the data and to write up the assignment.

Data set ***[Job Satisfaction]*** is from a global corporation. Three hundred employees of the company globally have been surveyed regards their job satisfaction in the company.

* 1. The variables include:
     1. ID
     2. “Gender” 1= male or 2=female
     3. Marital status (Married, single)
     4. Age
     5. Years of experience
     6. City where they come from (areas coded from 1 to 5)
     7. Region they come from (east, west, south, north)
     8. Departments (1=IT, 2=Marketing, 3= Sales, 4= HR, 5= Finance 6=Innovation)
     9. Salary (in thousands)
     10. Job satisfaction score *before* training (1= extremely dissatisfied; 5=extremely satisfied)
     11. Job satisfaction score *after* training (1= extremely dissatisfied; 5=extremely satisfied)
     12. Life happiness score (1= extremely unhappy; 10=extremely happy)
     13. Promoted (yes, No)

xiv. Organization relation and employee satisfaction survey (OR) (1 to 5)

xv. Teamwork and employee satisfaction survey (TW) (1 to 5)

xvi. Information and employee satisfaction survey (INF) (1 to 5)

xvii. Job passion and self-evaluation employee satisfaction survey (JP) (1 to 5)

xviii. Work/Life balance and employee satisfaction survey (WLB) (1 to 5)

**Assignment instructions:**

Using statistical theory and applications to complete the tasks listed below. You are expected to submit a word document in PDF format and an Excel file which is used to carry out the data analysis.

**Assignment structure and task:**

1. **Introduction– Introduce the business problems. (10 marks)**
   * 1. Describe the main objectives of the researchers who collected this dataset (1 marks)
     2. Describe how you want to achieve these objectives in this assignment (1 marks)
     3. List all statistical hypotheses you want to test in this assignment and indicate how the hypotheses are related to the research objective above.

(Note: you can put the hypotheses you are going to test in a table with names of the tests and purpose of the tests) (8 marks)

Hint: you should write this section after you finish all the following tasks.

1. **Do you think Salary is gender-biased? (10 marks)**
   * 1. Formulate a statistical hypothesis to test the gender-unbiasedness of payment (2 marks)
     2. Run the statistical test of the hypothesis (5 marks)
     3. Conclude your test result (3 marks)
2. **Do you think Salary is City area-dependent? (10 marks)**
   * 1. Formulate the test of equal Salary across all City areas (5 marks)
     2. Run the ANOVA test (8 marks)
     3. Interpret your results (3 marks)
3. **Do you think the training improves the job satisfaction? (20 marks)**
   * 1. Formulate a statistical test to support your opinion (3 marks)
     2. What is your null hypothesis and what is your alternative hypothesis? (2 marks)
     3. What is your chosen significance level of the test? (1 mark)
     4. Show your test workings (4 marks)
     5. Critically Interpret the test result (2 marks)
     6. Show an alternative way of test. (8 marks)
4. **Do you think promotion is gender biased? (10 marks)**
5. Create a two-way table of Gender and Promotion. (2 marks)
6. Formulate the statistical test of independence: the null hypothesis and the alternative hypothesis (2 marks)
7. Run the test (4 marks)
8. Interpret the results (2 marks)
9. **Relationship between two numerical variables: does salary depend on age? (15 marks)**
   * 1. Create a scatter plot between Age and Salary and interpret the graphs (5 marks)
     2. Run a regression of Salary on Age (5 marks)
     3. Interpret the regression output (5 marks)
10. **Relationship among many numerical variables: what determine the JSS after training? (15 marks)**
    * 1. Create 5 scatter plots between Job Satisfaction after Training and the 5 variables: OR, TW, INF, JP, and LWB respectively, and interpret the plots (5 marks)
      2. Run a multiple regression to quantify the influences on the JSS (5 marks)
      3. Interpret the regression output (5 marks)
11. **Format, Style, and References (10 marks)**

**BB108 Business Statistics**

**Marking Guide and ULO: Individual Assignment Report**

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| **Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student Number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | | | |  | | |
| **Tasks and ULO** | **Marks** | **Mark Range** | | | | |
| 1. Introduction   a, b, c, e | 10 | Not meeting the criteria of higher marks | (1) A statement of the business objective with respect to the business problems and intended investigation  (2) A clear formulation of statistical hypotheses and their relation to the business problems. | | (1) A clear statement of the business objective with respect to the business problems and intended investigation  (2) A clear formulation of statistical hypotheses and their relation to the business problems. (The hypotheses are to be tested in the following sections.) | (1) A clear statement of the business objective with respect to the business problems and intended investigation  (2) Presentation of a road map how statistical concepts can be used to assess the business problems  (3) A clear formulation of statistical hypotheses and their relation to the business problems. (The hypotheses are to be tested in the following sections.) |
|  |  | 0-5 | 5-6 | | 7-8 | 9-10 |
| 1. Gender-biasedness in the salary   b, c, d, e | 10 | Not meeting the criteria of higher marks | 1. Formulate the null hypothesis and the alternative hypothesis to assess gender-biasedness. 2. Run the test and report the results. 3. Interpret the test results | | 1. Formulate and justify the null hypothesis and the alternative hypothesis to assess gender-biasedness. 2. Run the test and report the results. 3. Properly interpret the test results | 1. A short description on how gender-biasedness can be assessed by statistical concepts. 2. Formulate and justify the null hypothesis and the alternative hypothesis to assess gender-biasedness. 3. Run the test and report the results. 4. Properly interpret the test results and comment on the reliability of the conclusion. |
| **Actual mark** |  | 0-5 | 5-6 | | 7-8 | 9-10 |
| **Comments** |  | | | | | |
| 1. Impact of training on the Job satisfaction   b, c, d, e | 20 | Not meeting the criteria of higher marks | 1. Formulate the null hypothesis and the alternative hypothesis to assess the impact. 2. Run the test and report the results. 3. Properly interpret the test results | | 1. Formulate and justify the null hypothesis and the alternative hypothesis to assess the impact. 2. Run the test and report the results. 3. Properly interpret the test results 4. Discuss alternative ways of assessment and present the results of an alternative statistical test | 1. A short description on how the impact of training on the Job satisfaction can be assessed by statistical concepts 2. Formulate and justify the null hypothesis and the alternative hypothesis to assess the impact. 3. Run the test and report the results. 4. Properly interpret the test results 5. Discuss alternative ways of assessment and present the results of an alternative statistical test |
| **Actual mark** |  | 0-9 | 10-3 | | 14-17 | 18-20 |
| **Comments** |  |  | | | | |
| 4 Impact of other factors  b, c, d, e | 20 | Not meeting the criteria of higher marks | 1. Formulate the null hypothesis and the alternative hypothesis to assess the impact. 2. Run the test and report the results. 3. Interpret the test results | | 1. Formulate and justify the null hypothesis and the alternative hypothesis to assess the impact. 2. Run the test and report the results. 3. properly interpret the test results | 1. A short description of how regional differences in Salary can be assessed statistically. 2. Formulate and justify the null hypothesis and the alternative hypothesis to assess the impact. 3. Run the test and report the results. 4. Properly interpret the test results |
| **Actual mark** |  | 0-4 | 5-6 | | 7-8 | 9-10 |
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| 1. Gender-biasedness Life happiness   b, c, d, e | 10 | Not meeting the criteria of higher marks | 1. Formulate the null hypothesis and the alternative hypothesis to assess gender-biasedness. 2. Run the test and report the results. 3. Interpret the test results | | 1. Formulate and justify the null hypothesis and the alternative hypothesis to assess gender-biasedness. 2. Run the test and report the results. 3. Properly interpret the test results | 1. A short description on how gender-biasedness can be assessed by statistical concepts. 2. Formulate and justify the null hypothesis and the alternative hypothesis to assess gender-biasedness. 3. Run the test and report the results. 4. Properly interpret the test results and comment on the reliability of the conclusion. |
| **Actual mark** |  | 0-5 | 5-6 | | 7-8 | 9-10 |
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| 6-7 Relationship between multiple numerical variables.  b, c, d, e | 30 | Not meet the criteria of higher marks | 1. Present scatter plots with a title, axis titles, the trend line, and the correlation coefficient. 2. Properly Interpret the slop of the trend line and the correlation coefficient 3. Report the results of the simple regressions and the multiple regression together with regression equations 4. Interpret the regression results 5. Draw conclusions from the regressions analysis. | | 1. Present proper scatter plots with a title, axis titles, the trend line, and the correlation coefficient. 2. Properly Interpret the slop of the trend line and the correlation coefficient 3. Report the results of the simple regressions and the multiple regression together with regression equations 4. Properly interpret the regression results based on the hypotheses under testing and the test outputs 5. Draw conclusions from the regressions analysis. | 1. Present proper scatter plots with a title, axis titles, the trend line, and the correlation coefficient. 2. Properly Interpret the slop of the trend line and the correlation coefficient 3. Report the results of the simple regressions and the multiple regression together with regression equations 4. Properly interpret the regression results based on the hypotheses under testing and the test outputs 5. Draw conclusions from the regressions analysis. 6. Comment, in particular, on using Regression Analysis as a tool to discover relation between/among variables, its advantage and pitfalls. |
| **Actual mark** |  | 0-13 | 14-17 | | 18-23 | 24-30 |
| **Comments** |  |  | | | | |
| 1. Writing up   a, b, c, e | 10 | Not meeting the criteria of higher marks | (1) Understandable expression with few typos  (2) correct referencing with a list of more than 12 academic articles | | (1) Excellent expression, punctuation, grammar editing  (2) correct referencing with a list of more than 12 academic articles, from which at least 8 are peer reviewed articles. | (1) Excellent expression, punctuation, grammar editing  (2) uniformly edited tables and diagrams (3) a proper style of academic writing (4) correct referencing articles |
| **Actual mark** |  | 0-4 | 5-6 | | 7-8 | 9-10 |
| **Comments** |  |  | | | | |