Assessment (non-exam) Brief

Module code/name	MSIN0017 Business Analytics
Module leader name	Yufei Huang
Academic year	2023/24
Term	1
Assessment title	Coursework 1
Individual/group assessment	Individual

Submission deadlines: Students should submit all work by the published deadline date and time. Students experiencing sudden or unexpected events beyond your control which impact your ability to complete assessed work by the set deadlines may request mitigation via the extenuating circumstances procedure. Students with disabilities or ongoing, long-term conditions should explore a Summary of Reasonable Adjustments.

Return and status of marked assessments: Students should expect to receive feedback within one calendar month of the submission deadline, as per UCL guidelines. The module team will update you if there are delays through unforeseen circumstances (e.g. ill health). All results when first published are provisional until confirmed by the Examination Board.

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Academic Misconduct: Academic Misconduct is defined as any action or attempted action that may result in a student obtaining an unfair academic advantage. **Academic misconduct includes plagiarism, obtaining help from/sharing work with others be they individuals and/or organisations or any other form of cheating.** Refer to Academic Manual Chapter 6, Section 9: Student Academic Misconduct Procedure - 9.2 Definitions.

Referencing: You must reference and provide full citation for ALL sources used, including AI sources, articles, text books, lecture slides and module materials. This includes any direct quotes and paraphrased text. If in doubt, reference it. If you need further guidance on referencing please see UCL's referencing tutorial for students. Failure to cite references correctly may result in your work being referred to the Academic Misconduct Panel.

Use of Artificial Intelligence (AI) Tools in your Assessment: Your module leader will explain to you if and how AI tools can be used to support your assessment. In some assessments, the use of generative AI is **not permitted** at all. In others, AI may be used in an **assistive** role which means students are permitted to use AI tools to support the development of specific skills required for the assessment as specified by the module leader. In others, the use of AI tools may be an **integral** component of the assessment; in these cases the assessment will provide an opportunity to demonstrate effective and responsible use of AI. See page 3 of this brief to check which category use of AI falls into for this assessment. Students should refer to the UCL guidance on acknowledging use of AI and referencing AI. Failure to correctly reference use of AI in assessments may result in students being reported via the Academic Misconduct procedure. Refer to the section of the UCL Assessment success guide on Engaging with AI in your education and assessment.

Content of this assessment brief

Section	Content
A	Core information
B	Coursework brief and requirements
C	Module learning outcomes covered in this assessment
D	Groupwork instructions (if applicable)
E	How your work is assessed
F	Additional information

Section A: Core information

Submission date	10/11/2023
Submission time	2pm
Assessment is marked out of:	100
% weighting of this assessment within total module mark	10%
Maximum word count/page length/duration	10 pages
Footnotes, appendices, tables, figures, diagrams, charts included in/excluded from word count/page length?	including everything
Bibliographies, reference lists included in/excluded from word count/page length?	including everything
Penalty for exceeding word count/page length	Penalty for exceeding word count will be a deduction of 10 percentage points, capped at 40% for Levels 4,5, 6, and 50% for Level 7) Refer to Academic Manual Section 3: Module Assessment - 3.13 Word Counts.
Penalty for late submission	Standard UCL penalties apply. Students should refer to https://www.ucl.ac.uk/academic-manual/chapters/chapter-4-assessment-framework-taught-programmes/section-3-module-assessment#3.12
Artificial Intelligence (AI) category	Not permitted
Submitting your assessment	Submission is via Moodle. Please only submit one single pdf file including everything. Do not include name or student number, as the marking is anonymous.
Anonymity of identity. Normally, <u>all</u> submissions are anonymous unless the nature of the submission is such that anonymity is not appropriate, illustratively as in presentations or where minutes of group meetings are required as part of a group work submission	The nature of this assessment is such that anonymity is required.

Section B: Assessment Brief and Requirements

Business Analytics: Coursework 1

1. The monthly open, high, low, close prices and average trading volume of Amazon between September 2013 and August 2014 are given in the following table:

Date	Open	High	Low	Close	Avg Vol
Aug 1, 2014	313.69	320.38	304.59	318.33	3,910,000
Jul 1, 2014	325.86	364.85	311.86	312.99	4,751,300
Jun 2, 2014	312.59	340.72	303.84	324.78	3,769,700
May 1, 2014	304.13	314.87	284.38	312.55	3,944,700
Apr 1, 2014	338.09	348.30	288.00	304.13	6,779,300
Mar 3, 2014	358.74	383.11	330.88	336.37	3,788,100
Feb 3, 2014	358.98	365.87	337.73	362.10	4,573,200
Jan 2, 2014	398.80	408.06	357.76	358.69	4,626,900
Dec 2, 2013	399.00	405.63	379.50	398.79	2,746,800
Nov 1, 2013	365.63	394.10	341.88	393.62	2,830,600
Oct 1, 2013	314.22	368.40	296.50	364.03	3,467,900
Sep 3, 2013	284.73	320.57	284.17	312.64	2,254,600

a. Calculate the mean and the standard deviation of Amazon's close prices during the following 6 months: Mar 2014-Aug. 2014. In addition, calculate the range of the average trading volume for all 12 months. Please submit your calculations (you can use a calculator for this section).
b. Was Amazon's coefficient of variation of open prices higher or lower than the coefficient of variation of its close prices? Submit a printout of the data, descriptive statistics, and calculations performed in Excel, and a conclusion.
c. Using Excel, please submit a histogram and a frequency table for Amazon average trading volume during 12 months, with respect to the bins: 2,000,000; 3,000,000; 4,000,000; … ; 7,000,000.

2. In a survey, participants in the UK are classified according to income, location, and education. The data is shown in the table below in percentages of the total.

	Higher Education			
	Yes		No	
Live in London	High Income	Low Income	High Income	Low Income
Yes	15	8	3	20
No	12	4	16	22

(a) If a participant is selected at random, what is the probability that this participant lives in London?

(b) Given that a participant selected at random has taken higher education, what is the probability that this participant has high income?

(c) Given that a participant selected at random has high income and is in London, what is the probability that this participant has taken higher education?

(d) Are the events taking higher education and having high income independent? Why or why not?

3. A medical device manufacturer has found that 5% of the syringes are defective. The manufacturer produces 25 of these syringes per minute. Assume that manufacturing problems are independent.

    a. Find the probability that every minute, 2 defective syringes are produced. For this question, please write down your calculation. You can use the calculator.

    b. Find the probability that every minute, between 1 and 4 (inclusive) defective syringes are produced. For this question, please write down your calculation. You can use the calculator.

    c. Use Excel to calculate the probability function and the cumulative probability function of the defective syringes. For this section please take a snapshot of your Excel sheet and include it in your report.

    d. Based on your calculation in Excel, what is the probability that more than 3 defective syringes are produced per minute?

    e. Plot a graph of the probability and cumulative probability functions.

4. A company operates two call centers for customer service in London and Glasgow. The annual cost of running the London center follows a normal distribution with a mean of £1,000,000, and a standard deviation of £500,000. And the annual cost of running the Glasgow center follows a normal distribution with a mean of £800,000, and a standard deviation of £200,000.

(a) What is the probability that the annual cost of the London center is more than £1,800,000?

(b) What is the probability that the annual cost of Glasgow center is between £500,000 and 1,000,000?

(c) What is the probability that the total annual cost of the company is below 2,000,000?

5. One of the major measures of the service quality of any organization is the speed with which it responds to customer complaints. A large department store is reviewing its service quality in last year. Last year, there were 30 complaints. The following data (including 30 numbers) represents the number of days between the receipt of a complaint and the resolution of the complaint:

        54, 5, 35, 137, 31, 27, 152, 2, 123, 81, 74, 27, 11, 19, 126
        110, 110, 29, 61, 35, 94, 31, 26, 5, 12, 4, 165, 32, 29, 28

Construct a 95% confidence interval estimate of the mean number of days between the receipt of a complaint and the resolution of the complaint, assuming that the population of this service time follows a normal distribution.

You can use Excel to calculate the std and mean of the sample, but please use a calculator and tables for the rest of your answer. Please submit all of your calculations, Excel printouts, and the final answer. Please justify all steps in your solution.

Section C: Module Learning Outcomes covered in this Assessment

This assessment contributes towards the achievement of the following stated module Learning Outcomes as highlighted below:

This assignment contributes towards the achievement of the following stated module Learning Outcomes as below:

- Understand key concepts in statistics.
- Interpret data from descriptive statistics, measures of central tendency and measures of dispersion.
- Critically analyse datasets and sampling methods.
- Apply statistical tests to verify significance of findings.
- Identify appropriate methods to present data.
- Recognise the benefits and limitations of statistical calculations and analysis.

Section D: Groupwork Instructions (where relevant/appropriate)

N/A

Section E: How your work is assessed

Within each section of this assessment you may be assessed on the following aspects, as applicable and appropriate to this assessment, and should thus consider these aspects when fulfilling the requirements of each section:

- The accuracy of any calculations required.
- The strengths and quality of your overall analysis and evaluation;
- Appropriate use of relevant theoretical models, concepts and frameworks;
- The rationale and evidence that you provide in support of your arguments;
- The credibility and viability of the evidenced conclusions/recommendations/plans of action you put forward;
- Structure and coherence of your considerations and reports;
- Appropriate and relevant use of, as and where relevant and appropriate, real world examples, academic materials and referenced sources. Any references should use either the Harvard OR Vancouver referencing system (see References, Citations and Avoiding Plagiarism)
- Academic judgement regarding the blend of scope, thrust and communication of ideas, contentions, evidence, knowledge, arguments, conclusions.
- Each assessment requirement(s) has allocated marks/weightings.

Student submissions are reviewed/scrutinised by an internal assessor and are available to an External Examiner for further review/scrutiny before consideration by the relevant Examination Board.

It is not uncommon for some students to feel that their submissions deserve higher marks (irrespective of whether they actually deserve higher marks). To help you assess the relative strengths and weaknesses of your submission please refer to SOM Assessment Criteria Guidelines, located on the Assessment tab of the SOM Student Information Centre Moodle site.

The above is an important link as it specifies the criteria for attaining the pass/fail bandings shown below:

At UG Levels 4, 5 and 6:

80% to 100%: Outstanding Pass - 1st; 70% to 79%: Excellent Pass - 1st; 60%-69%: Very Good Pass - 2.1; 50% to 59%: Good Pass - 2.2; 40% to 49%: Satisfactory Pass - 3rd; 20% to 39%: Insufficient to Pass - Fail; 0% to 19%: Poor and Insufficient to Pass - Fail.

At PG Level 7:

86% to 100%: Outstanding Pass - Distinction; 70% to 85%: Excellent Pass - Distinction; 60%-69%: Good Pass - Merit; 50% to 59%: Satisfactory - Pass; 40% to 49%: Insufficient to Pass - Fail; 0% to 39%: Poor and Insufficient to Pass - Fail.

You are strongly advised to review these criteria before you start your work and during your work, and before you submit.

You are strongly advised to **not** compare your mark with marks of other submissions from your student colleagues. Each submission has its own range of characteristics which differ from others in terms of breadth, scope, depth, insights, and subtleties and nuances. On the surface one submission may appear to be similar to another but invariably, digging beneath the surface reveals a range of differing characteristics.

Students who wish to request a review of a decision made by the Board of Examiners should refer to the UCL Academic Appeals Procedure, taking note of the acceptable grounds for such appeals.

Note that the purpose of this procedure is not to dispute academic judgement – it is to ensure correct application of UCL's regulations and procedures. The appeals process is evidence-based and circumstances must be supported by independent evidence.

Section F: Additional information from module leader (as appropriate)

Marking scheme is as follows:
Q1 [total 20 marks]
Q1a: 10 marks
Q1b: 5 marks
Q1c: 5 marks

Q2 [total 20 marks]
Q2a: 4 marks
Q2b: 4 marks
Q2c: 4 marks
Q2d: 4 marks
Q2e: 4 marks

Q3 [total 20 marks]
Q3a: 4 marks
Q3b: 4 marks
Q3c: 4 marks
Q3d: 4 marks
Q3e: 4 marks

Q4 [total 20 marks]
Q1a: 6 marks
Q1b: 6 marks
Q1c: 8 marks

Q5 [total 20 marks]
Using excel to find descriptive stats: 3 marks
Correctly choosing confidence level: 10 marks
Correctly constructing confidence interval: 7 marks

Further notes: A complete answer should include key steps, i.e., definitions, equations and final results. Answers should also include brief explanations and justifications of the approaches/equations/theories used in the calculation. If the questions request, a brief summary or discussion of results should also be included in the answer. Partial marks may be given to correct key steps if final result is wrong.