

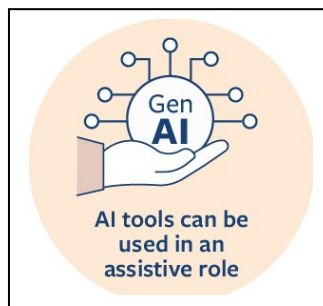
This question paper consists of 9 printed pages, each is identified by the Code Number LUBS5308M

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(Semester 1, 2024/2025)

Assessed Coursework

LUBS5308M Business Analytics and Decision Science

100% Assignment



This assignment contains two equally weighted parts. You must complete both part 1 and part 2.

### Part 1: Business Analytics: Predicting Potential Return (50% marks – 1500 words maximum):

**Background information:** 'PhysicalSound' is an e-commerce website that operates as a direct-to-consumer business. It is based in Great Britain, and its main business is selling physical music media such as Vinyl, Cassettes, and CDs. As the company expands, it would like to understand better how to increase customer spending on the website and potentially better estimate its future revenue by deciding who it wants to attract to the website.

**Business Question:** You work for 'PhysicalSound' as a business analyst and have been provided with data on orders made on the website in July 2024. The company would like to answer two business questions:

1. What factors cause customers to spend more or less on a website's online platform? The company has provided you with a sample of orders made on the website in July 2024. (order\_july24.csv)
2. The company wants a predictive model that predicts customer spending on the website. It intends to use this to evaluate different groups of customers as part of its expansion consideration. You should build this model based on the data of orders from July 2024. You should demonstrate the model's effectiveness and

also predict the spending of an additional 20 customers (new\_customer24.csv). Your prediction will be evaluated against the actual spending before making a decision on using your model.

The company's management asked that you provide a detailed analysis addressing both business questions. The study should address the business requirement and justify the answer using the appropriate business analysis method. It must be in a format and language suitable for the intended audience of this company's management team, allowing them to understand the answer.

**Data Provided:** The following is information about data provided by the management team: order\_july24.csv and new\_customer24.csv

The 'order\_july24.csv' contains six variables and 2000 orders sampled from July 2024. The dataset is explained below.

- spend – This is the final total spending for each sample order in GBP.
- ad\_channel – This is the advertisement medium that brought the customer to the website, which includes: '1' for Leaflet, '2' for Social Media, '3' for Search Engine, '4' for Influencer
- age – According to the website tracking software, this is the customer's estimated age.
- past\_spend – Total spending made by the customer before this order by the customer.
- time\_web – The time (in seconds) the customer has spent on the website before making this order.
- voucher – this is a flag identifying whether the customer has used a 5% discount voucher for this order with the values '0' for No and '1' for Yes

The 'new\_customer24.csv' file contains five variables within the 'order\_july24.csv' file, but does not contain 'spend'. Instead, you are given the variable 'order', which represents the order number for reference. This data must be used as part of the 2<sup>nd</sup> business question in part 1.

**Marking Criteria for Part 1:** You should present your findings using tables, figures, and text as appropriate. The report should be suitable for communicating with the management team. You can use any relevant technique and software to answer the business question. Your report should use tables and figures as appropriate and text to present your findings. Your report should justify the answer logically. The report should be suitable for communication with the management team. The report should be within the word count specified of 1500 words. Please refer to page 9 for details of what should be included or not included as part of the word count.

Additionally, you must submit the spending prediction for 20 orders provided in new\_customer24.csv. This should be in the following format and included in the main text. The table should be excluded from the word count.

<u>order</u>	<u>prediction</u>
<u>1</u>	<u>XXX.XX</u>

<u>2</u>	<u>XXX.XX</u>
<u>3</u>	<u>XXX.XX</u>
<u>...</u>	<u>...</u>
<u>20</u>	<u>XXX.XX</u>

The marks for the assignment are awarded based only on the main text. The submission will be judged per the following marking criteria.

### **Marking Scheme**

<b>Success Criteria</b>	<b>Description</b>	<b>Weighting</b>
Overall Presentation	The presentation of the report must have an appropriate structure and format for the intended audience, make proper use of tables and visuals, and have language appropriate for the communication based on the objective of the report.	10%
Business Understanding	The report must demonstrate an understanding of the business question and requirements.  It must also articulate an answer to the initial business question.	10%
Data Understanding	The report must help the audience understand the data, allowing them to answer the business question.  An appropriate utilisation of visuals and statistics must be presented.	10%
Data Preparation	The submission must demonstrate that data preparation, including transformation and handling of missing data, has been appropriate to ensure that the answer to the business question is suitable.  The submission should provide sufficient details about any interpretation, assumptions and transformation of data so that the audience can understand and verify the answer.	15%
Modelling	The submission must demonstrate that an appropriate model to answer the business question has been selected and provide appropriate justification.  The submission must demonstrate that the model has been appropriately applied and must ensure that the report's audience can understand the process	25%

	<p>leading to the recommendation and the reasoning behind it.</p> <p>The modelling must be suitable for the business requirements.</p>	
Evaluation	<p>The submission must demonstrate that the model has been evaluated and that the recommendation is appropriate concerning the requirements that have been set.</p> <p>The submission must demonstrate the robustness of the methodology and ensure that any assumptions made have been evaluated.</p>	15%
Conclusion	The submission must provide a clear and concise answer that addresses the business question.	15%

## End of PART 1

### Part 2: Business Decision-Making: Trial of Delivery Robot (50% marks – 1,500 words maximum):

**Background information:** You are a data analyst working for a new start-up venture, AutonomousShipment, based in Leeds. The company wants to use autonomous robots to conduct last-leg logistics operations and deliver parcels from various stores to customers' doorsteps. Essentially, the company will provide a local hub that collects parcel shipments from various logistic providers before using an autonomous mini robot to deliver the product from the logistics hub to the recipient in the area. The company believes that consumers would benefit from faster and more routine delivery through automation and that the various logistic providers would benefit from optimisation of resources, increased customer satisfaction and reduced costs.

The company's key differentiation from other startup is that it has developed several prototype robots. The seven prototypes are shown below. Detailed information on each of the prototypes, as assessed in the preliminary stage by the design and development team, is available in the 'Robot\_Info.csv' file:

- Robot A032 – Aura
- Robot B23 – Bowler
- Robot CJKL – Comer
- Robot DSXX – Deviant
- Robot E568 – Eva
- Robot F789 – Fleur
- Robot GG00 – Grant

**Business Question:** The company is ready to conduct large-scale trials. It has procured a hub in Leeds and is working with three logistics provider companies to conduct last-leg delivery. Given that this is a trial and that the company has limited resources, they must consider which prototype robots should be part of it. The trial will allow the company to evaluate these prototypes in real-life conditions. Due to cost and time constraints, they can only select two prototypes for the evaluation. Therefore, they have developed the following selection requirements based on the information from the preliminary analysis and their two-business strategy.

The company has to make a business decision with regard to the choice of robots to use in their future operation. As part of this business decision, you have been asked to recommend two robot prototypes, one for each of the following business plans.

1. The management team's primary business model is based on operating at scale and maximising the number of deliveries of large products, which are more profitable for the company. They have conducted a detailed stakeholder analysis and provided information on the factors that impact their decision to select robots in 'Management\_Priority.xlsx'.
2. Alternatively, the management team would like to consider a prototype for an alternative business strategy being formulated. In this alternative strategy, the focus is not on their operation but on selling the robot technology. Given the current autonomous robot technology, valuable intellectual technology would be in battery capacity, cost, and reliability. Unfortunately, they have not yet conducted a detailed stakeholder analysis but have asked you to provide recommendations based on the described strategy.

To address this decision, the company's management has asked that you provide a detailed analysis addressing the decision-making problems. The study should address the business requirement and justify the recommendation based on appropriate decision science and multiple-criteria decision analysis methods. It must be in a format and language suitable for the intended audience of the management team of this new start-up company, allowing them to understand how the decision recommendation has been made and why it has been made.

**Data Provided:** The following information has been provided by the management team: Robot\_Info.csv and Management\_Priority.xlsx.

The 'Robot\_Info.csv' file contains seven criteria for robot capability, which are either quantitatively or qualitatively assessed and then presented. This information should be the basis for the recommendation regarding the decision-making question.

- Carrying Capacity – The carrying capacity of each autonomous robot in litres. Larger is better.
- Battery Size – The battery capacity in hours of operation for each autonomous delivery robot. Larger is better.
- Speed—The average speed in km/h for each robot. Higher is better.
- Mobility—The subjective judgement of a robot's ability to navigate with mobility. The score is an assessment out of five, with higher scores indicating more mobility.

- **Aesthetic** – The subjective judgement of a robot's aesthetic look. The score is an assessment out of ten, with higher as more aesthetically pleasing
- **Cost per Unit**—The cost per unit of each robot in GBP. Lower is better.
- **Reliability**—The estimated average time between breakdowns of each different prototype. The unit is measured in days of operation until breakdown. Higher is better.

The file Management\_Priority.xlsx provides the management team's importance of each criterion for their primary business model. It is a note from a management meeting describing the results of their discussion giving information on the factors that impact their decision to select robots for the primary business model.

**Marking Criteria for Part 2:** You should present your findings using tables, figures, and text as appropriate. The report should be suitable for communicating with the management team. You can use any relevant techniques and software to answer the business question. Your report should use tables and figures as appropriate and text to present your findings. Your report should justify why your approach is the optimal and logical solution. The report should be suitable for communication with the management team. The report should be within the word count specified of 1500 words. Please refer to page 9 for details of what should be included or not included as part of the word count.

The marks for the assignment are based only on the main text. The submission will be judged per the following marking criteria.

Success Criteria	Description	Weighting
Overall Presentation	The presentation of the report must have an appropriate structure and format for the intended audience, make proper use of tables and visuals, and have language appropriate for the communication based on the objective of the report.	10%
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Data Understanding	The report must help the audience understand the data, allowing them to answer the business question.  An appropriate utilisation of visuals and statistics must be presented.	10%
Data Preparation	The submission must demonstrate that data preparation, including transformation and handling of missing data, has been appropriate to ensure that the answer to the business question is suitable.	15%

	The submission should provide sufficient details about any interpretation, assumptions and transformation of data so that the audience can understand and verify the answer.	
Modelling	<p>The submission must demonstrate that an appropriate model to answer the business question has been selected and provide appropriate justification.</p> <p>The submission must demonstrate that the model has been appropriately applied and must ensure that the report's audience can understand the process leading to the recommendation and the reasoning behind it.</p> <p>The modelling must be suitable for the business requirements.</p>	25%
Evaluation	<p>The submission must demonstrate that the model has been evaluated and that the recommendation is appropriate concerning the requirements that have been set.</p> <p>The submission must demonstrate the robustness of the methodology and ensure that any assumptions made have been evaluated.</p>	15%
Conclusion	The submission must provide a clear and concise answer that addresses the business question.	15%

## End of Part 2

### Submission Guidelines

You must submit two files:

1. A maximum 3000-word report that answers to two parts of this assessed coursework. Each part should contain at most 1500 words.
2. .zip file containing all code/excel files for all analysis that are used to complete this assessed coursework. This will not be included in the word count. All must be included in the submission if you use more than one tool/file.

#### **GenerativeAI - Guideline**

This assignment is categorised **AMBER for the use of GenAI: generative artificial Intelligence (GenAI) may only be used in an assistive role, as specifically**

**articulated below, with acknowledgement.** In the rest of this work, you must not use GenAI.

**Specifically**, this assignment requires you to write the content of all sections; **you MAY NOT use GenAI assistance in the writing process.** As these test the module's learning outcomes, it's essential to demonstrate your abilities. You will be asked to certify that the submission is in your own words.

You may use GenAI (if you wish) to help understand the business problem and establish a business understanding, improve your data understanding and consider options for investigation, prepare data for analysis by considering the correct variable and unit, suggest a model for an analytic solution, provide contrast between the different options to evaluate the model and help articulate answers to the business questions.

Past students have noted that understanding the problem is onerous for some people but easier for others. If you would find it helpful, you may use GenAI to (1) summarise the business area or topics, enabling you to have better domain expertise of the subject, and (2) tidy up your code or Excel after you have written the code [for example, you may have written a specific code to convert the data to a format for the analysis and then ask Co-Pilot to check if it is suitable for what you want].

Note that you may NOT ask Co-Pilot to create content or write things for you.

Also, remember that you retain responsibility for what you hand in; Co-Pilot is susceptible to errors and biases, so always check over anything you've used GenAI on.

Finally, please note that these instructions are particular to this assignment. Other assignments will have different instructions for which parts you may and may not use GenAI. Not all Amber assignments will be the same.

**Remember to reference your use of GenAI as well as your literature sources.**

<https://generative-ai.leeds.ac.uk/ai-and-assessments/acknowledging-use-of-ai/>

### **Assignments should be a maximum of 3000 words in length.**

All coursework assignments that contribute to the assessment of a module are subject to a word limit, as specified on the assessment brief. **The word limit is an extremely important aspect of good academic practice, and must be adhered to.** Unless stated otherwise, the word count includes EVERYTHING (i.e. all text in the main body of the assignment including summaries, subtitles, contents pages, tables, supportive material whether in footnotes or in-text references) except the main title, reference list and/or bibliography and any appendices. It is not acceptable to present matters of substance, which should be included in the main body of the text, in the appendices ("appendix abuse"). It is not acceptable to attempt to hide words in graphs and diagrams; only text which is strictly necessary should be included in graphs and diagrams.

You are required to adhere to the word limit specified and state an accurate word count on the cover page of your assignment brief. Your declared word count must be accurate, and should not mislead. Making a fraudulent statement concerning the work submitted for assessment could be considered



academic malpractice and investigated as such. If the amount of work submitted is higher than that specified by the word limit or that declared on your word count, this may be reflected in the mark awarded and noted through individual feedback given to you.

**The deadline date for this assignment is 12:00:00 noon on Monday 6<sup>th</sup> January 2025.**

An electronic copy of the assignment must be submitted to the Assignment Submission area within the module resource on the Blackboard MINERVA website no later than 12:00:00 noon prompt on the deadline date.

Faxed, emailed or hard copies of the assignment will not be accepted.

Failure to meet this initial deadline will result in a reduction of marks, details of which can be found at the following place:

<https://students.business.leeds.ac.uk/assessment/code-of-practice-on-assessment/>

### **SUBMISSION**

Please ensure that you leave sufficient time to complete the online submission process, as upload times can vary. Accessing the submission link before the deadline does **NOT** constitute completion of submission. You **MUST** click the '**CONFIRM**' button before 12:00:00 noon for your assignment to be classed as submitted on time, if not you will need to submit to the Late Area and your assignment will be marked as late. It is your responsibility to ensure you upload the correct file to the MINERVA, and that it has uploaded successfully.

**It is important that any file submitted follows the conventions stated below:**

### **MITIGATING CIRCUMSTANCES**

If you are affected by circumstances that will have a short-term impact on your ability to complete coursework assessments (for example a minor illness), you can make an application for an extension to a coursework deadline. Please note, all extension requests must be made prior to the original assessment deadline. To read more about this process please click here - <https://students.business.leeds.ac.uk/student-support/mitigating-circumstances-extensions-and-additional-consideration/>

### **FILE NAME**

The name of the file that you upload must be your student ID only.

### **ASSIGNMENT TITLE**

During the submission process the system will ask you to enter the title of your submission. This should also be your student ID only.

### **FRONT COVER**

The first page of your assignment should always be the Assessed Coursework Coversheet (individual), which is available to download from the following location:

<https://students.business.leeds.ac.uk/forms-guidance-and-coversheets/>

### **STUDENT NAME**

You should **NOT** include your name anywhere on your assignment

**END**