MIS771 – Descriptive Analytics and Visualisation – Trimester 2 2024
Assessment Task 2 – Data Analysis & Report – Individual

DUE DATE:	**15 Sep 8 pm (Melbourne time)**
PERCENTAGE OF FINAL GRADE:	**35%**
WORD COUNT:	**Part B: 1500 words**

Tasks

Assignment two is an individual assignment with three tasks. The first task is to report on the plan to deliver the assessment on time. The second task is to analyse the given dataset and draw conclusions. Finally, the third task is to convey the findings and conclusions in a written report to an expert in Business Analytics.

To complete the assignment, you must use the dataset file named T22024A2.xlsx and apply the techniques covered in Module 2.

Specific Requirements

You are the lead modeller at Methods9, an analytic startup that assists businesses with analytic solutions. Senior partner - Cindy Varanasi (MBA and MSc in Data Science) has asked you to lead the modelling component for several recent projects she has secured. The minutes of the meeting are below. You must review and complete the modelling activities per the document below.

	Method9				Reference	PJ 11-15 Modelling
	Methods9 727 Collins St, Docklands VIC 3008 Phone: (+61 3 212 66 000) info@method9.com.au				Revised	August 20, 2024
					Level	Expert Analysis
Meeting Chair	Cindy Varanasi					
Date	20 August 2024	**Time**	9:00 AM	**Location**	F3.101	
Topic	Modelling					
Meeting Purpose:	**Specifying and allocating data analytics tasks**					
Discussion items:	• *GroceryPlus*: Modelling Sales. • *BikeMart*: Testing the effect of promotional campaign and advertising expense on Sales. • *Gadget4U*: Modelling the likelihood of a customer purchasing a complementary product. • *CosmeticChain*: Modelling the likelihood of a store manager resigning. • *MoonlightAle*: Forecasting Pale Ale production in the upcoming four quarters. • Producing a technical report.					

Detailed Action Items	Who:	What:
	{you}	1. Build a model to estimate *Sales* of a *GroceryPlus* store.
		2. Prior research shows that advertising expenditure is a significant predictor of Bike Sales at *BikeMart*. Cindy believes that the relationship between advertising expenditure and sales is also influenced by the number of promotional campaigns. Test Cindy's assumption by modelling the interaction between the predictors and the target variable.
		3. Build a model to predict which customers will buy headphones after purchasing a mobile phone at *Gadget4U*.
		4. Cindy has already done the initial analysis for a model to predict the likelihood of a store manager resigning at *CosmeticChain*. She has narrowed down the key predictors to the manager's age, experience, and gender.
		4.1. Develop a model to ascertain the likelihood of a store manager resigning.
		4.2. Cindy is specifically interested in understanding the probability of a manager in mid-thirties with varying levels of managerial experience (i.e. 2-16 years) and across both genders resigning. Accordingly, visualise the predicted probability of resigning with the values and attributes described earlier.
		5. Develop a time-series model to forecast the production volumes of pale ale for the next four fiscal quarters.
		6. Produce a written technical report detailing all conclusion and analysis activities. The report should be comprehensive (describe all critical analyses and conclusions). The analysis should drive the conclusions and the recommendations to the management team (a clear link/alignment).
Next meeting	15 Sep 2024	

Explanatory Notes

To accomplish allocated tasks, you must thoroughly examine and analyse the dataset. Below are some guidelines to follow:

Task 1. – Model building

It is **IMPORTANT** to follow an appropriate model-building process. Include all steps of the model-building activities (**especially all relevant pre- and post-model diagnostics**) in your analysis. Include as many Excel worksheets (tabs) as you require to demonstrate different iterations of your regression model (i.e., 1.2.a., 1.2.b., 1.2.c. etc.). Please note all reasonable/realistic assumptions about the parameters next to the analysis.

The **technical report** should explain why the model might have undergone several iterations (your modelling approach). Also, provide a detailed interpretation of ALL elements of the **final** model/regression output and state the conclusions.

Task 2. – Interaction effect

Develop a new regression model using ONLY the factors discussed in the team meeting (Item 2) to accomplish this task. Is there evidence that the interaction term makes a significant contribution to the model? Please note all reasonable/realistic assumptions about the parameters next to the analysis.

The **technical report** should clearly explain the role of each variable included in the model and use visualisation to illustrate the interaction effect (if any or lack of it). Finally, provide managerial recommendations based on the results of the analysis.

Task 3 – Model building

Build a predictive model. You must make reasonable/realistic/practical assumptions about the parameters mentioned in Task 3.

Task 4.1 – Model building

You should start building the predictive model by including ONLY the variables listed in the team meeting (Item 4.1). You must make reasonable/realistic/practical assumptions about the parameters mentioned in Task 4.1.

The **technical report** should provide a detailed interpretation of ALL elements of the model/logistic regression output and state the conclusions.

Task 4.2 – Visualising and interpreting predicted probabilities

The **technical report** must include the predicted probability visualisation and the practical recommendations. These recommendations should broadly answer the following question:

> *"How changes in store manager's age, experience and gender affect the predicted probabilities of resigning"*

Task 5. – Forecasting Production

Past quarterly production volumes are in the Excel file. The task is to develop a suitable model to forecast Quarterly production volumes for **the next four quarters**.

In the **technical report**, explain the reason for selecting the forecasting method to forecast future Sales. The report also must include a detailed interpretation of the **final** model (e.g. a practical interpretation of the time-series model…etc.)

Task 6. – Technical report

The **technical report** must be as comprehensive. All analysis and final outputs must be described/interpreted in detail.

Remember, the report audience is an expert in analytics and expects **a very high standard of work**. High standards mean **quality content** (demonstrated attention to detail) and an **aesthetically appealing report**.

> **Note:** The use of technical terms is encouraged and expected in this assignment.

The report should include an **introduction** as well as a **conclusion**. The introduction begins with the purpose(s) of the analysis and concludes by explaining the report's structure (i.e., subsequent sections). The conclusion should highlight the essential findings and explain the main limitations.

There is no requirement for a table of contents or an executive summary.

Submission

The assignment consists of **three** documents:

- *Planning and execution tables*
- *Analysis*
- *Technical Report*

1) Assignment Planning and Execution Tables

The planning and execution details should be submitted in the appropriate tables provided. The tables should be in dot points. Before filling in the tables, students are strongly encouraged to watch the pre-recorded workshop called 'How to plan an assignment and turn the plan into action?' by a Language and Learning Adviser.

> **Note:** Give the assignment planning and execution file the following name
>
> **A2_Planning_YourStudentID.docx**

2) Analysis

The analysis should be submitted in the appropriate worksheets in the Excel file. Each step in the model buildings should be included in a separate tab (e.g. 1.1., 1.2. …). Add more worksheets if necessary.

Before submitting the analysis, ensure it is logically organised and any incorrect or unnecessary output has been removed. Marks will be deducted for poor presentation or disorganised/incorrect results. The worksheets should follow the order in which tasks are allocated in the minutes of the team meeting document.

> **Note**: Give the Excel file the following name **A2_YourStudentID.xlsx** (use a short file name while you are doing the analysis).

3) Technical Report

The technical report consists of three sections: **Introduction**, **Main Body**, and **Conclusion**. The report should be approximately 1,500 words.

Use proper headings (i.e., 2., 2.1., 2.2., …) and titles in the main body of the report. Use sub-headings where necessary.

Visualisations / statistical output expected in the report are:

1. Interaction effect plots
2. Predicted probability plots.

Ensure these outputs are **visually appealing**, have **consistent formatting style** and **proper titles** (title, axes titles etc.), and are **numbered correctly**. Where necessary, refer to these outputs in the main body of the report.

> **Note**: Give the report the following name **A2_YourStudentID.docx**.

Learning Outcomes

This task allows you to demonstrate your achievement towards the Unit Learning Outcomes (ULOs) which have been aligned to the [Deakin Graduate Learning Outcomes](#) (GLOs). Deakin GLOs describe the knowledge and capabilities graduates acquire and can demonstrate on completion of their course. This assessment task is an important tool in determining your achievement of the ULOs. If you do not demonstrate achievement of the ULOs you will not be successful in this unit. You are advised to familiarise yourself with these ULOs and GLOs as they will inform you on what you are expected to demonstrate for successful completion of this unit.

The learning outcomes that are aligned to this assessment task are:

| Unit Learning Outcomes (ULOs)		Graduate Learning Outcomes (GLOs)
ULO 1	Apply quantitative reasoning skills to solve complex problems.	**GLO1**: **Discipline-specific knowledge and capabilities** - appropriate to the level of study related to a discipline or profession. **GLO5: Problem Solving** - creating solutions to authentic (real-world and ill-defined) problems.
ULO 2	Plan, monitor, and evaluate own learning as a data analyst.	**GLO6**: **Self-Management** - working and learning independently, and taking responsibility for personal actions
ULO 3	Deduce clear and unambiguous solutions in a form that they useful for decision-making and research purposes and for communication to the wider public.	**GLO1**: **Discipline-specific knowledge and capabilities** - appropriate to the level of study related to a discipline or profession. **GLO2**: **Communication -** using oral, written and interpersonal communication to inform, motivate and effect change

Marking and feedback

The marking rubric indicates the assessment criteria for this task. It is available in the CloudDeakin unit site in the Assessment folder, under Assessment Resources. Criteria act as a boundary around the task and help specify what assessors are looking for in your submission. The criteria are drawn from the ULOs and align with the GLOs. You should familiarise yourself with the assessment criteria before completing and submitting this task.

Students who submit their work by the due date will receive their marks and feedback on CloudDeakin 15 working days after the submission date.

Extensions

Extensions can only be granted for exceptional and/or unavoidable circumstances outside of your control. Requests for extensions must be made by 12 noon on the submission date using the online Extension Request form under the Assessment tab on the unit CloudDeakin site. *All requests for extensions should be supported by appropriate evidence (e.g., a medical certificate in the case of ill health) and a draft of the assignment.*

Applications for extensions after 12 noon on the submission date require university-level special consideration, and they must be submitted via StudentConnect on your DeakinSync site.
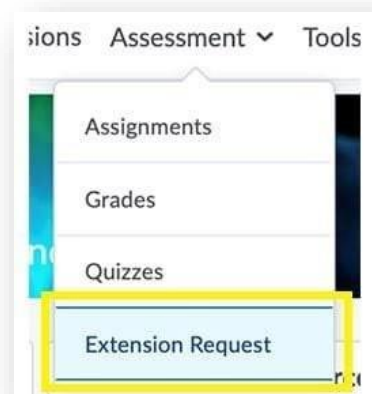
Late submission penalties

If you submit an assessment task after the due date without an approved extension or special consideration, 5% will be deducted from the available marks for each day after the due date up to seven days*. Work submitted more than seven days after the due date will not be marked and will receive 0% for the task. The Unit Chair may refuse to accept a late submission where it is unreasonable or impracticable to assess the task after the due date. *'Day' means calendar day for electronic submissions and working day for paper submissions.

An *example* of how the calculation of the late penalty based on an assignment being due on a Sunday at 8:00pm is as follows:

- 1 day late: submitted after Thursday 11:59pm and before Monday 11:59pm– 5% penalty.
- 2 days late: submitted after Friday 11:59pm and before Tuesday 11:59pm – 10% penalty.
- 3 days late: submitted after Saturday 11:59pm and before Wednesday 11:59pm – 15% penalty.
- 4 days late: submitted after Sunday 11:59pm and before Thursday 11:59pm – 20% penalty.
- 5 days late: submitted after Monday 11:59pm and before Friday 11:59pm – 25% penalty.
- 6 days late: submitted after Tuesday 11:59pm and before Saturday 11:59pm – 30% penalty.
- 7 days late: submitted after Wednesday 11:59pm and before Sunday 11:59pm – 35% penalty.

The Dropbox closes on Sunday after 11:59pm AEST/AEDT time.

Support

The Division of Student Life provides a range of **Study Support** resources and services, available throughout the academic year, including **Writing Mentor** and **Maths Mentor** online drop-ins and the SmartThinking 24-hour writing feedback service at **this link**. If you would prefer some more in-depth and tailored support, **make an appointment online with a Language and Learning Adviser**.

Referencing and Academic Integrity

Deakin takes academic integrity very seriously. It is important that you (and if a group task, your group) complete your own work in every assessment task Any material used in this assignment that is not your original work must be acknowledged as such and appropriately referenced. You can find information about referencing (and avoiding breaching academic integrity) and other study support resources at the following website: http://www.deakin.edu.au/students/study-support

Your rights and responsibilities as a student

As a student, you have both rights and responsibilities. Please refer to the document *Your rights and Responsibilities as a student* in the Unit Guide & Information section in the Content area in the CloudDeakin unit site.