QUALIFI ASSESSMENT DOCUMENT

Qualifi Level 4 Diploma in Artificial Intelligence

Assignment brief – Unit 402

Qualification	AID 402 Mathematical Foundations for Machine Learning
Unit Reference	X
Qualification Reference (RQF)	X
No of Credits	**20**

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Introduction

Prior to attempting this coursework assignment, Learners must familiarise themselves with the following policies:

- Centre Specification Can be found at https://qualifi.net/qualifi-level-4-diploma-in-artificial-intelligence/
- Qualifi Quality Assurance Standards
- Qualifi Quality Policy Statement

Assignment Guidelines

All work must be submitted in a single electronic document (.doc/.docx file). The assignment must be the Learner's own work and not copies of theories or models. Direct quotes should be kept to a minimum, and shown in inverted commas. Models described and other quotes used must be properly attributed and referenced as appropriate. Learners must acknowledge or reference any sources that have been used to complete the assignment, listing reference material and web sites used.

Plagiarism and Collusion

In submitting the assignment Learner's must complete a statement of authenticity confirming that the work submitted for all tasks is their own. The statement should also include the word count. Plagiarism and collusion are treated very seriously. Plagiarism involves presenting work, excerpts, ideas or passages of another author without appropriate referencing and attribution. Collusion occurs when two or more learners submit work which is so alike in ideas, content, wording and/or structure that the similarity goes beyond what might have been mere coincidence.

Appendices

Separate Appendices should not be used. Any use of tables, graphs, diagrams, Gantt chart and flowcharts etc. that support the main report should be incorporated into the back of the assignment report that is submitted. Any published secondary information such as annual reports and company literature, should be referenced in the main text of the assignment but not included.

Confidentiality

Where a Learner is using organisational information that deals with sensitive material or issues, they must seek the advice and permission from that organisation about its inclusion. Where confidentiality is an issue, Learners are advised to anonymise their assignment report so that it cannot be attributed to that particular organisation.

Word Count Policy

In total, the assignment should be between 3000 – 4000 words. Learners must comply with the required word count, within a margin of +10%.These rules exclude the index (if used), headings and information contained within references and bibliographies. When an assessment task requires learners to produce presentation slides with supporting notes, the word count applies to the supporting notes only.

Marking and grades

Qualifi uses a standard marking rubric for all assignments, and you can find the details at the end of this document.

Unless stated elsewhere, Learners must answer all questions in this document.

Unit Title	AID 402 Mathematical Foundations for Machine Learning
Unit Reference (RQF)	B
No of Credits	20

Learning Outcomes and Assessment Criteria

Learning Outcomes When awarded credit for this unit, a learner will:	**Assessment Criteria** Assessment of this learning outcome will require a learner to demonstrate that they can:
1. Understand the role of math and statistics in Machine Learning.	1.1 Explain probability and its importance in business analytics.
	1.2 Calculate the probability of specific outcomes in given business scenarios.
	1.3 Classify with reasons, a given data as qualitative or quantitative
2. Understand statistical methods and tools for data analysis.	2.1 Explain the concept of inferential statistics and its role i business decision-making.
	2.2 For a given business case, explain a hypothesis that can be used to outline a statistical test to validate it.
	2.3 Interpret the results of hypothesis tests in the context of business analytics.
3. Be able to integrate statistica methods in solving business challenges.	3.1 Describe linear regression in analytics
	3.2 Compute a simple linear regression model using a provided dataset
	3.3 Interpret the coefficients based on multiple regression analysis on a given dataset.
	3.4 Solve problems using derivatives (Product Rule, Quotient Rule) in business-related scenarios.
4. Be able to propose business solutions based on inferential statistics results.	4.1 Solve integral problems using trigonometric functions, exponentials, and logarithms, and explain their relevance in business contexts.
	4.2 Discuss the concept of computational complexity and it implications in data processing.
	4.3 Analyze a given complex dataset and interpret the results using appropriate statistical methods

Referencing and Professionalism

A professional approach to work is expected from all learners. Learners must therefore identify and acknowledge ALL sources/methodologies/applications used. The learner must use an appropriate referencing system to achieve this. Marks are not awarded for the use of English; however the learner must express ideas clearly and ensure that appropriate terminology is used to convey accuracy in meaning.

Submission of Assignments

All work must be submitted in a single electronic document (.doc/.docx file) in your Learning Portal or to submit to the Assessor/Centre Administrator.

ASSESSMENT TASKS

Task 1 FORMATIVE TASK Maths and Statistics in Machine Learning

FORMATIVE TASK

Instruction: Produce a briefing paper for the management team at your organisation about the role played by maths and statistics in Machine Learning. The team consists of humanities graduates who do not have specialist mathematical knowledge, Your answer must contain the following:

- An outline of probability as a mathematical concept, and its value in business analytics.
- Identify and explain how outcomes to business scenarios are calculated using probability
- A discussion of how data is classified either as qualitative or quantitative.

Formatting:

850-1150 words	12pt Times New Roman font
Justified alignment	Use an appropriate referencing system for
Single-spaced	footnotes and citations

Task 2 SUMMATIVE TASK Maths in Action in a Business Environment

SUMMATIVE TASK

Instruction: You have been tasked with solving a business problem in your organisation using statistical methods. Your report on this project must include the following:

- An outline of the business problem and of the proposed mathematical solution to the problem (LO 2.1, 2.2, 3.1, 4.1))
- Identify and explain how linear regression and other inferential statistics results have been used to solve the problem, (LO 2.3, 3.2, 3.3)
- Evaluate the current and potential effectiveness of these methods in the analysis of complex data within your organisation, (LO 3.4, 4.2, 4.3)

Assessment Criteria Assessment of this learning outcome will require a learner to demonstrate that they can:
2.1 Explain the concept of inferential statistics and its role in business decision-making. 2.2 For a given business case, explain a hypothesis that can be used to outline a statistical test to validate it. 2.3 Interpret the results of hypothesis tests in the context of business analytics.
3.1 Describe linear regression in analytics 3.2 Compute a simple linear regression model using a provided dataset 3.3 Interpret the coefficients based on multiple regression analysis on a given dataset. 3.4 Solve problems using derivatives (Product Rule, Quotient Rule) in business-related scenarios.
4.1 Solve integral problems using trigonometric functions, exponentials, and logarithms, and explain their relevance in business contexts. 4.2 Discuss the concept of computational complexity and its implications in data processing. 4.3 Analyze a given complex dataset and interpret the results using appropriate statistical methods

Formatting:

1850-2150 words	12pt Times New Roman font
Justified alignment	Use an appropriate referencing system for
Single-spaced	footnotes and citations

Learners are required to complete all tasks.

Mark Scheme

Grade	Distinction		Merit	Pass		FAIL	
Mark	80-100	70-79	60-69	50-59	40-49	30-39	0-39
Content (alignment with assessment criteria)	Extensive evaluation and synthesis of ideas; includes substantial original thinking	Comprehensive critical evaluation and synthesis of ideas; includes coherent original thinking	Adequate evaluation and synthesis of key ideas beyond basic descriptions; includes original thinking	Describes main ideas with evidence of evaluation; includes some original thinking	Describes some of the main ideas but omits some concepts; limited evidence of evaluation; confused original thinking	Largely incomplete description of main issues; misses key concepts; no original thinking	Inadequate information or containing information not relevant to the topic
Application of Theory and Literature	In-depth, detailed and relevant application of theory; expertly integrates literature to support ideas and concept	Clear and relevant application of theory; fully integrates literature to support ideas and concepts	Appropriate application of theory; integrates literature to support ideas and concepts	Adequate application of theory; uses literature to support ideas and concepts	Limited application of theory; refers to literature but may not use it consistently	Confused application of theory; does not use literature for support	Little or no evidence of application of theory and relevant literature
Knowledge and Understanding	Extensive depth of understanding and exploration beyond key principles and concepts	Comprehensive knowledge and depth of understanding key principles and concepts	Sound understanding of principles and concepts	Basic Knowledge and understanding of key concepts and principles	Limited and superficial knowledge and understanding of key concepts and principles	Confused or inadequate knowledge and understanding of key concepts and principles	Little or no evidence of knowledge or understanding of key concepts and principles
Presentation and Writing Skills	Logical, coherent and polished presentation exceeding expectations at this level; free from errors in mechanics and syntax	Logical, coherent presentation demonstrating mastery; free from errors in mechanics and syntax	Logical structure to presentation; makes few errors in mechanics and syntax which do not prohibit meaning	Orderly presentation; minor errors in mechanics and syntax	Somewhat weak presentation; errors in mechanics and syntax may interfere with meaning	Confused presentation; errors in mechanics and syntax often interfere with meaning	Illogical presentation lacking cohesion; contains significant errors that interfere with meaning
Referencing	Advanced use of in-text citation and references	Mastery of in-text citation and referencing	Appropriate use of in-text citation and referencing	Adequate use of in-text citation and referencing	Limited use of in-text citation and referencing	Inadequate use of citation and referencing	Little or no evidence of appropriate referencing or use of sources

Instructor's Comments

Marking Directions:

1. For each of the criteria listed in the first column, circle one box in the corresponding column to the right which best reflects the student's work on this particular assessment activity (e.g., project, presentation, essay).

2. Provide specific feedback to a student about each of the criteria scores he/she earned by writing comments and suggestions for improvement in the last row titled "Instructor's comments."

3. To arrive at a mark, total the boxes and divide by 5 to arrive at a final mark

Criteria	**Score**
Content	50
Application of Theory and Literature	40
Knowledge and Understanding	50
Presentation/Writing Skills	40
Referencing	40
Total Score	220/5 = **44, Basic**

Qualifi Information

HEAD OFFICE

7 Acorn Business Park

Commercial Gate, Nottingham

Nottinghamshire

NG18 1EX

LONDON OFFICE

Golden Cross House

8 Duncannon Street, London

WC2N 4JF

info@qualifi.net