

**CMP3751M Machine Learning Assessment Item 1 of 2 CRG 2021-2022****Indicative Weighting: 100%****Task 1**

Learning Outcome	Criterion	Pass	2:2	2:1	1st
LO1 Critique and appraise the scope and limits of machine learning methods by identifying their strengths and weaknesses	Section 1.1: Implementation of Polynomial Regression (10%). This section contains a detailed description of your implementation of polynomial regression. Each step in your code needs to be clearly commented and described in detail.	The following tasks have been carried out to a basic standard and may not be fully completed: i) You have implemented the <code>pol_regression</code> function as defined in the briefing document. Your implementation might contain errors or is very inefficient. ii) You have commented and explained your implementation.	The following tasks have been carried out to a good standard and are almost fully completed: i) You have implemented the <code>pol_regression</code> function as defined in the briefing document. ii) You have commented and explained your implementation.	The following tasks have been carried out to a very good standard and are fully completed: i) You have implemented the <code>pol_regression</code> function as defined in the briefing document. ii) You have commented and explained your implementations in detail	The following tasks have been carried out to an excellent standard and are fully completed: i) You have implemented the <code>pol_regression</code> function as defined in the briefing document. ii) You have commented and explained your implementation. Every step in your implementation has been motivated and explained.
	Section 1.2: Regress a polynomial of the following degrees: 0, 1, 2, 3, 6, 10 (10%). The report needs to contain the required plots as well as code snippets. The results depicted in the plots should be discussed and interpreted.	The following tasks have been carried out to a basic standard and may not be fully completed: i) You have shown some plots. ii) The results are insufficiently discussed.	The following tasks have been carried out to a good standard and are almost fully completed: You have shown all required plots and discussed the results.	The following tasks have been carried out to a very good standard and are fully completed: You have shown all required plots and discussed the results properly, reflecting on the steps you have undertaken.	The following tasks have been carried out to an excellent standard and are fully completed: You have shown all required plots and discussed the results in rigorous detail.
	Section 3: Evaluation (10%). This section contains a detailed description of your implementation of <code>eval_pol_regression</code> function. Each step in your code needs to be clearly commented and described in detail. The report needs to contain the required plots as well as code snippets. The results depicted in the plots should be discussed and interpreted.	The following tasks have been carried out to a basic standard and may not be fully completed: i) You have implemented the <code>eval_pol_regression</code> function as defined in the briefing document. Your implementation might contain errors or is very inefficient. ii) You have commented and explained your implementation, and iii) You have shown some plots, but	The following tasks have been carried out to a good standard and are almost fully completed: i) You have implemented the <code>eval_pol_regression</code> function as defined in the briefing document. ii) You have commented and explained your implementation and iii) You have shown all required plots and discussed the results. Your discussion of	The following tasks have been carried out to a very good standard and carefully completed: i) You have implemented the <code>eval_pol_regression</code> function as defined in the briefing document. ii) You have commented and explained your implementation and iii) You have shown all required plots and discussed the results. Your discussion of	The following tasks have been carried out to an excellent standard and are fully completed: i) You have implemented the <code>eval_pol_regression</code> function as defined in the briefing document. ii) You have commented and explained your implementation, and every step has been motivated and explained. iii) You have shown all required plots and discussed the results in

		the results are insufficiently discussed. You tried to relate your results to over and under fitting, but your conclusion is erroneous.	overfitting and underfitting is correct but not complete.	overfitting and underfitting is correct and complete.	rigorous detail. Your discussion of overfitting and underfitting is very good and shows your excellent understanding of these concepts.
Weighting	Criteria in this assessment are weighted as indicated by the percentages presented above.				

## Task 2

Learning Outcome	Criterion	Pass	2:2	2:1	1st
LO1 Critique and appraise the scope and limits of machine learning methods by identifying their strengths and weaknesses	Section 2.1: Description of the K-Means Clustering (15%) In this section, you should discuss your understanding of the K-Means clustering algorithm and its foundations.	You have provided a brief description of the algorithm. However, you missed many listed points in the briefing document and/or your description is unclear.	You have provided a good description of the algorithm and most of the listed points in the briefing document. However, your description for some points is unclear or lacking details.	You have provided a good description of all the listed points in the briefing document. Your description for most of the points is clear and correct. Some mathematical concepts and equations have been well defined and explained.	You have provided an excellent description of all the listed points in the briefing document. Your description for all the points is clear and correct. All mathematical concepts and equations have been well defined and explained.
	Section 2.2: Implementation of the K-Means Clustering (15%) In this section, you should demonstrate that you are able to implement the (simple) K-Means clustering in Python and apply it to explore patterns in a real-world data.	Either of the following tasks have been carried out: 1) You have implemented the (simple) K-Means clustering using Python by yourself. However, your implementation didn't follow the suggested steps. 2) You have provided the required plots of running the K-Means clustering for the given data.	The following tasks have been carried out: 1) You have implemented the (simple) K-Means clustering using Python by yourself following the suggested steps. However, some steps are not correct or not clearly presented in the report. 2) You have provided the required plots of running the K-Means clustering for the given data.	The following tasks have been carried out to a good standard: 1) You have implemented the (simple) K-Means clustering using Python by yourself following the suggested steps. All steps are correct. 2) You have provided the required plots of running the K-Means clustering for the given data.	The following tasks have been carried out to an excellent standard: 1) You have implemented the (simple) K-Means clustering using Python by yourself following the suggested steps. All steps are correct. 2) You have clearly commented and explained your implementation. 3) You have provided the required plots and discussed the results in rigorous detail.
Weighting	Criteria in this assessment are weighted as indicated by the percentages presented above.				

## Task 3

LO1 Critique and appraise the scope and limits	Section 3.1: Data import, summary, pre-	You have provided a basic description of the dataset, carried out	You have described the dataset to a good standard, carried out some data pre-	You have described the dataset to a very good standard, carried out significant data pre-	You have clearly described the dataset to an excellent standard, carried our substantial and key
--	---	---	---	---	--

<p>of machine learning methods by identifying their strengths and weaknesses</p> <p>LO2: Using a non-trivial dataset, plan, execute and evaluate significant experimental investigations using multiple machine learning strategies</p>	<p>processing and visualisation (10%)</p> <p>This section is focused on data summary, pre-processing and visualisation.</p>	<p>some data pre-processing steps, and provided one of the plots. Your discussion and presentations are brief with little critique.</p>	<p>processing steps, and provided the plots. Your discussion and presentations are clear and informative and provide adequate detail on some data preprocessing steps or data visualisation or interpretation.</p>	<p>processing steps with proper explanation, and provided the two plots to a good standard. Your discussion and presentations are clear and detailed, with good understanding of the processes and techniques used.</p>	<p>data preprocessing steps with extensive explanation, and provided the two plots to a great standard. Your discussion and presentations are detailed, in-depth, and offer a critique of the steps undertaken. A significant amount of the discussion is related to the key information obtained from the processes.</p>
	<p>Section 3.2: Designing Algorithms (15%)</p> <p>This section presents the detailed process to design and implement an algorithm on a data set.</p>	<p>The following tasks have been carried out to a basic standard and may not be fully complete: i) You have split the data as required; ii) You have explained the process to implement at least one of the algorithms; iii) You have reported the results of at least one algorithm.</p>	<p>The following tasks have all been carried out to a good and detailed standard: i) You have split the data as required; ii) You have explained the process to implement both algorithms; iii) You have reported the results of both algorithms.</p>	<p>The following tasks have all been carried out to a very good and detailed standard: i) You have split the data as required; ii) You have explained the process to implement both algorithms; iii) You have reported the results of both algorithms.</p>	<p>The following tasks have all been carried out to an outstanding and detailed standard: i) You have split the data as required; ii) You have explained the process to implement both algorithms; iii) You have reported the results of both algorithms. A significant amount of discussion has been provided to explain the implementation of the algorithms and results.</p>
	<p>Section 3.3: Model Selection (15%)</p> <p>This section presents the detailed process to select the best model from some candidate models</p>	<p>The following tasks have been carried out to a basic standard and may not be fully complete: i) You have split the data as required; ii) You have explained the process to implement 10-fold CV for at least one of the algorithms to select model parameters; iii) You have reported the results of at least one algorithm; iv) You have correctly selected the best model.</p>	<p>The following tasks have all been carried out to a good and detailed standard: i) You have split the data as required; ii) You have explained the process to implement 10-fold CV for both algorithms to select model parameters; iii) You have reported the results of both algorithms; iv) You have correctly selected the best model.</p>	<p>The following tasks have all been carried out to a very good and detailed standard: i) You have split the data as required; ii) You have explained the process to implement 10-fold CV for both algorithms to select model parameters; iii) You have reported the results of both algorithms; iv) You have correctly selected the best model; v) You have correctly explained how you have chosen the best model.</p>	<p>The following tasks have all been carried out to an outstanding and detailed standard: i) You have split the data as required; ii) You have explained the process to implement 10-fold CV for both algorithms to select model parameters; iii) You have reported the results of both algorithms; iv) You have correctly selected the best model; v) You have correctly explained how you have chosen the best model. A significant amount of discussion has been provided to explain the implementation of the algorithms and results.</p>
Weighting	Criteria in this assessment are weighted as indicated by the percentages presented above.				