



Daffodil International University
Faculty of Science & Information Technology
Department of Computing and Information System
 Final Examination, Fall-2025
Course Code: CIS313, Course Title: Artificial Intelligence
 Level: 3 Term: 3

Exam Duration: 2 Hours

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	(a)	Define Artificial Intelligence. briefly explain the difference between "Thinking Humanly" and "Acting Rationally."	[3]	CLO - 2,3,3
	(b)	Why is Uniform Cost Search (UCS) guaranteed to find the optimal solution, whereas Depth-First Search (DFS) is not? Explain in terms of path costs.	[3]	
	(c)	You are given an evaluation function $f(n) = g(n) + h(n)$. - Explain how Greedy Best-First Search utilizes this function (i.e., which part does it ignore?). - Explain how A* Search utilizes this function. - Which of the two is complete, and why?	[4]	
2.	(a)	Describe the Hill Climbing algorithm. Explain the concepts of a Plateau and a Ridge . Why are these considered problems for local search algorithms?	[4]	CLO - 2,3,4
	(b)	Briefly define Linear Regression and Logistic Regression . State the primary difference in the type of output variable (target) each model predicts.	[2]	
	(c)	A Data Scientist is building a model to predict the following: - The price of a house (in dollars). - Whether a loan application will be Approved (1) or Denied (0). - The daily temperature (in Celsius). - If an email is Spam or Not Spam. Classify which algorithm (Linear or Logistic) should be used for each case and briefly explain why.	[4]	
3.	(a)	What is vector in Machine Learning? Give a proper example. Distinguish between parameter and hyper-parameter.	[2]	CLO - 2,3,4 X
	(b)	What is the vanishing gradient problem? In which activation functions is it most severe, and why? Give at least two modern solutions to mitigate it.	[3]	

(c)	Consider a single linear neuron: $y' = wx + b$ and MSE Loss: $L = \frac{1}{N} \sum_{i=1}^N (y_i - (wx_i + b))^2$ Compute $\partial L / \partial w$ and $\partial L / \partial b$ and write the final Batch Gradient Descent updates for w and b using learning rate η.	[5]	
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4.	(a)	[4]	CLO L- 4,5,3
	(b)	[4]	
	(c)	[2]	

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