Mid Semester Examination

Course Name: Artificial Intelligence **Code: CS 561**

Full Marks-40 **Time: 2 hours**

Answer ALL the questions

Make reasonable assumptions as and whenever necessary. You can answer the questions in any sequence. However, the answers to all the parts of any particular question should appear together.

Q1. When and under what conditions hill climbing performs well? Show the various steps of hill climbing algorithm for the following 8-puzzle problem. Assume the heuristic function to be the number of misplaced tiles.

2+5

2	8	3
6	1	4
7		5

Start Sate

1	2	3
8		4
7	6	5

Goal State

Q2. "Local Beam Search" algorithm is a special case of "Random Restart Search" - Prove or disprove this statement with proper examples and explanations. Compute the time and space complexities of "Breadth First Search" and "Uniform Cost Search" with proper explanations.

3+5

Q3. For document classification, multinomial naïve Bayes classifier is more suitable than multivariate naïve Bayes classifier-Please explain your answer in favor or against this claim. Based on the data given in the following table, (i). estimate a multinomial naïve Bayes classifier; (ii). Apply classifier to the test document. (***Show each step with proper explanation***)

3+7

	docID	Words in document			In c= AI?
Training set	1	Logic	Inference	Learning	yes
	2	Search	Planning	Learning	yes
	3	Logic	Inference	Re-inforcement	yes
	4	Security	Privacy	Network	no
Test set	5	Logic	Learning	Privacy	?

Q4. Give an INDUCTIVE proof of the fact that "before A* terminates there is always on the open list a node whose *f(.)* value is less than or equal to *f*(S)*, where *S* is the start node of the search graph".

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Q5. Prove or disprove rigorously: "If monotone restriction is satisfied, nodes in the optimal path -assume only one optimal path- in the search graph will be expanded in the order of their depth from the start node. Assume there is no cycle in the search graph".

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