

TUTORIAL 3

1. Suppose you have the following search space.

State	Next	Cost
A	B	4
A	C	1
B	D	3
B	E	8
C	C	0
C	D	2
C	F	6
D	C	2
D	E	4
E	G	2
F	G	8

i) Draw the state space of this problem.

(5 markah/marks)

ii) Assume that the initial state is A and the goal state is G. Show how each of the following search strategies would create a search tree to find a path from the initial state to the goal state:

- Breadth First Search
- Depth First Search
- Depth-First Iterative Deepening search

At each step of the search algorithm, show which node is being expanded, and the content of fringe. State the eventual solution found by each algorithm, and the solution cost.

(15 markah/marks)

2. Solve the following 8 puzzle game using Breadth First Search (BFS). Can you find the solution? Solve the puzzle using Depth Limited Search (DLS) and compare the results.

Start state :

1	2	8
	3	4
7	6	5



Goal state :

1	2	3
8		4
7	6	5

From the two (2) searching strategy which strategy gives the optimum performance?
Explain your answer.

(20 markah/marks)

3. For the 8-puzzle problem, given this initial starting state

2	8	7
3	1	4
5	6	

- i) Using breadth first search, show the search tree that would be built down to level 2 (assume level zero is the root of the tree).

(4 markah/marks)

- ii) Using depth first search, show the state of the search tree down the level 3 (stop once you have expanded one node that goes to level 3)

(4 markah/marks)

- iii) What is the worst-case time and space complexity of the above two algorithms.

(4 markah/marks)

- iv) Describe the terms complete and optimal with regards to evaluating search strategies?

(4 markah/marks)

- v) Are either depth-first-search or breadth-first-search complete or optimal? Justify your answer.

(4 markah/marks)

