

BRAC UNIVERSITY
CSE422 : Artificial Intelligence
Fall 2025

Duration: 30 minutes

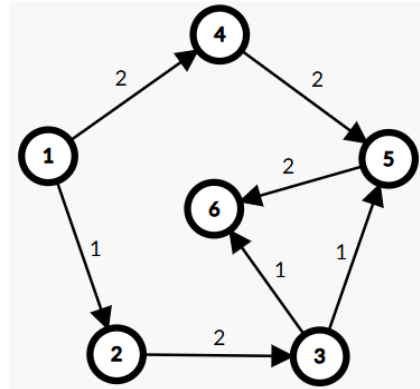
Quiz 1

Total: 15 marks

Name: _____ **ID:** _____ **0.5 Points**

Section: _____ **0.5 Points**

1. Consider the following graph with 1 as the initial node and 6 as the goal node, and 3 heuristics:



	1	2	3	4	5	6
h_1	4	3	2	4	2	0
h_2	4	3	1	4	2	0
h_3	4	3	1	3	1	0

a. Is the heuristic h_1 admissible? If not, write one node for which the admissibility condition does not hold. (1 point)

Answer: No. Node 3.

b. Is the heuristic h_2 admissible? If not, write one node for which the admissibility condition does not hold. (1 point)

Answer: Yes.

c. Is the heuristic h_3 admissible? If not, write one node for which the admissibility condition does not hold. (1 point)

Answer: Yes.

d. Which of the heuristics h_2 and h_3 is dominant. Write the nodes for which the dominance condition holds. (2 points)

Answer: h_2 . Node 4,5.

Which of the given heuristics is the best suited for performing A* search on the graph? (1 Point)

Answer: h_2 .

2. Consider the following initial and final state of an 8-puzzle problem:

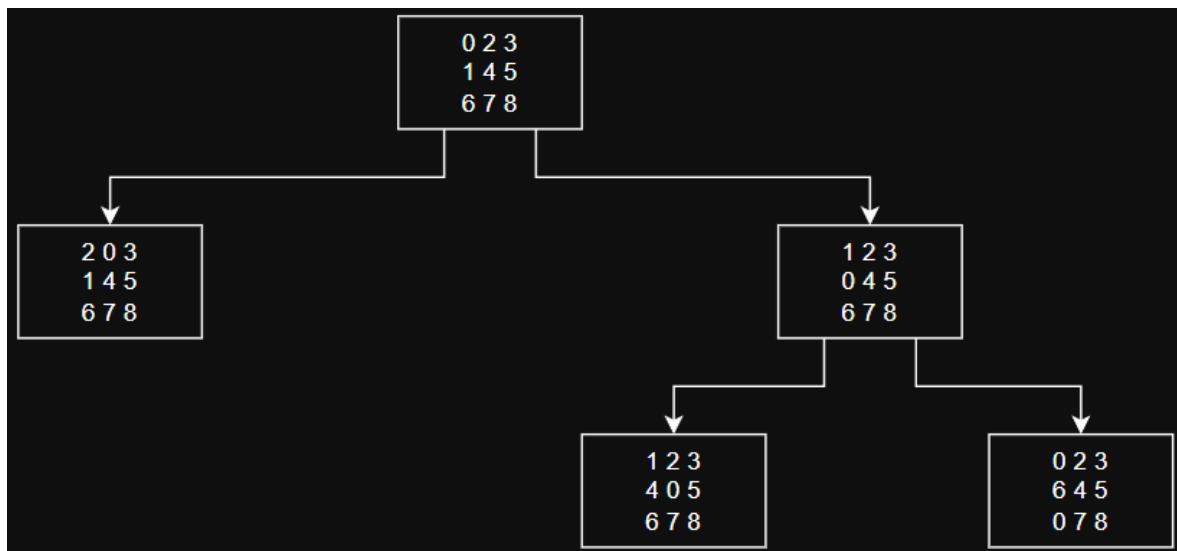
	2	3	1	2	3
1	4	5	4		5
6	7	8	6	7	8

Initial State

Final State

You are to find the most cost-effective path to reach the final state from the initial state using the **A* search algorithm**. Consider that **$g(n)$ = depth of node** and **$h(n)$ = hamming distance**. Draw the search tree that the algorithm generates. In addition, write the values of $g(n)$ and $h(n)$ for each state in that search tree. (8 Points)

Solution:



Bonus

Prove that every consistent heuristic is admissible. (1.5 Points)

Solution: