AI Search Strategy Questions

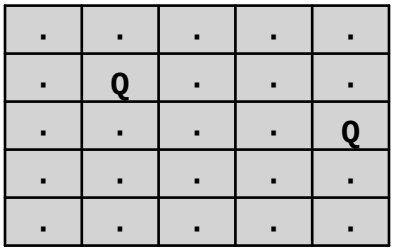
Generated from Knowledge Graph Analysis

This document contains problem instances for various AI search problems and questions about the most appropriate solving strategies. Each problem includes instance visualizations and detailed answers based on knowledge graph analysis.

1. N-Queens

Instance 1:

Board Size: 5×5, **Pre-placed Queens:** 2



Question: For the N-Queens problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?

Answer:

Best Strategy: DFS
✓ *Complete - finds solution if one exists* | ✓ *DFS/Backtracking perfect for CSP*

Properties: Optimal, Complete

Alternative Strategies:

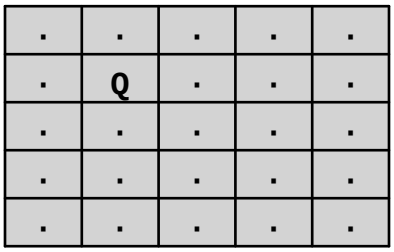
• **Backtracking**: For medium instances

• **BFS**: For guaranteed optimal when no heuristic

Recommended Heuristics: Number of Conflicts, Attacking Pairs

Instance 2:

Board Size: 5×5, **Pre-placed Queens:** 1



Question: For the N-Queens problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?

Answer:

Best Strategy: DFS
✓ Complete - finds solution if one exists | ✓ DFS/Backtracking perfect for CSP

Properties: Optimal, Complete

Alternative Strategies:

- **Backtracking**: For medium instances
- **BFS**: For guaranteed optimal when no heuristic

Recommended Heuristics: Number of Conflicts, Attacking Pairs

2. Tower of Hanoi

Instance 1:

Number of Disks: 4

Initial Configuration:
Peg A: [4, 3, 2, 1]
Peg B: []
Peg C: []

Goal: All disks on Peg C

> **Question: For the Tower of Hanoi problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?**

Answer:

> **Best Strategy: DFS**
> *✓ Guarantees optimal solution (required) | ✓ Complete - finds solution if one exists | ✓ DFS matches recursive structure of Hanoi*
>
> **Properties:** Optimal, Complete
>
> **Alternative Strategies:**
>
> • **BFS**: For guaranteed optimal when no heuristic
>
> • **UCS**: When actions have varying costs
>
> **Recommended Heuristics:** Number of Disks to Move

Instance 2:

Number of Disks: 3

Initial Configuration:
Peg A: [3]
Peg B: [2]
Peg C: [1]

Goal: All disks on Peg C

> **Question: For the Tower of Hanoi problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?**

Answer:

Best Strategy: DFS
✓ Guarantees optimal solution (required) | ✓ Complete - finds solution if one exists | ✓ DFS matches recursive structure of Hanoi | ✓ Simple search sufficient for small instance

Properties: Optimal, Complete

Alternative Strategies:

• **BFS**: For guaranteed optimal when no heuristic

• **UCS**: When actions have varying costs

Recommended Heuristics: Number of Disks to Move

3. Graph Coloring

Instance 1:

Vertices: 6, **Colors Available:** 4, **Edges:** 6

Graph Edges:
(0, 2), (0, 5), (1, 4), (3, 4), (3, 5), (4, 5)

> **Question: For the Graph Coloring problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?**

Answer:

> **Best Strategy: DFS**
> *✓ Complete - finds solution if one exists | ✓ DFS/Backtracking perfect for CSP*
>
> **Properties:** Optimal, Complete
>
> **Alternative Strategies:**
>
> • **Backtracking**: For medium instances
>
> • **BFS**: For guaranteed optimal when no heuristic
>
> **Recommended Heuristics:** Degree Heuristic, Minimum Remaining Values

Instance 2:

Vertices: 5, **Colors Available:** 3, **Edges:** 5

Graph Edges:
(0, 1), (0, 3), (1, 2), (1, 4), (3, 4)

> **Question: For the Graph Coloring problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?**

Answer:

> **Best Strategy: DFS**
> *✓ Complete - finds solution if one exists | ✓ DFS/Backtracking perfect for CSP | ✓ Simple search sufficient for small instance*
>
> **Properties:** Optimal, Complete
>
> **Alternative Strategies:**

• **Backtracking**: For small instances

• **BFS**: For guaranteed optimal when no heuristic

Recommended Heuristics: Degree Heuristic, Minimum Remaining Values

4. Knight's Tour

Instance 1:

Board Size: 5×5, **Starting Position:** (1, 4), **Visited Squares:** 9

6	9	.	.	.
.	.	5	8	1
4	7	.	.	.
.	.	.	2	.
.	3	.	.	.

Question: For the Knight's Tour problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?

Answer:

Best Strategy: DFS
✓ Complete - finds solution if one exists | ✓ DFS standard for knight tour backtracking | ✓ Simple search sufficient for small instance

Properties: Optimal, Complete

Alternative Strategies:

• **BFS**: For guaranteed optimal when no heuristic

• **UCS**: When actions have varying costs

Recommended Heuristics: Warnsdorff's Rule, Accessibility Heuristic

Instance 2:

Board Size: 5×5, **Starting Position:** (3, 0), **Visited Squares:** 8

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

Question: For the Knight's Tour problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?

Answer:

Best Strategy: DFS
✓ Complete - finds solution if one exists | ✓ DFS standard for knight tour backtracking | ✓ Simple search sufficient for small instance

Properties: Optimal, Complete

Alternative Strategies:

• **BFS**: For guaranteed optimal when no heuristic

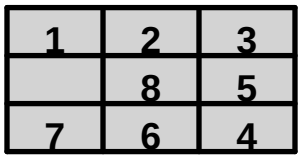
• **UCS**: When actions have varying costs

Recommended Heuristics: Warnsdorff's Rule, Accessibility Heuristic

5. 8-Puzzle

Instance 1:

Initial State (Goal: 1-2-3-4-5-6-7-8-blank)



Question: For the 8-Puzzle problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?

Answer:

Best Strategy: A*
✓ Guarantees optimal solution (required) | ✓ Complete - finds solution if one exists | ✓ Admissible heuristic guarantees optimal solution for puzzles

Properties: Optimal, Complete, Admissible heuristic

Alternative Strategies:

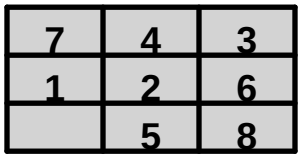
• **IDA***: When memory limited but optimality required

• **RBFS**: For medium instances

Recommended Heuristics: Manhattan Distance, Misplaced Tiles

Instance 2:

Initial State (Goal: 1-2-3-4-5-6-7-8-blank)



Question: For the 8-Puzzle problem and the given instance, which is the most appropriate solving strategy among those mentioned in the course (BFS, DFS, UCS, A*, GBFS, IDA*, Hill Climbing, Simulated Annealing)?

Answer:

Best Strategy: A*
✓ Guarantees optimal solution (required) | ✓ Complete - finds solution if one exists | ✓ Admissible

heuristic guarantees optimal solution for puzzles

Properties: Optimal, Complete, Admissible heuristic

Alternative Strategies:

• **IDA***: When memory limited but optimality required

• **RBFS**: For medium instances

Recommended Heuristics: Manhattan Distance, Misplaced Tiles