**Summary of results:**

**Depth First Search:**

*tinyMaze:*

Expanded Nodes (DFS): 15

Path Cost (DFS): 10

Optimal: No (since BFS found a path cost of 8, which is lower)

*mediumMaze:*

Expanded Nodes (DFS): 146

Path Cost (DFS): 130

Optimal: No (BFS and A\* found lower path costs)

*bigMaze:*

Expanded Nodes (DFS): 390

Path Cost (DFS): 210

Optimal: Yes (both BFS and A\* found the same path cost of 210)

**Breadth First Search:**

*tinyMaze:*

Expanded Nodes (BFS): 15

Path Cost (BFS): 8

Optimal: Yes (this is the lowest path cost found)

*mediumMaze:*

Expanded Nodes (BFS): 269

Path Cost (BFS): 68

Optimal: Yes (this is the lowest path cost found)

*bigMaze:*

Expanded Nodes (BFS): 620

Path Cost (BFS): 210

Optimal: Yes (this is the lowest path cost found)

**AStar Search:**

*tinyMaze:*

Expanded Nodes (A\*): 14

Path Cost (A\*): 8

Optimal: Yes (this is the lowest path cost found)

*mediumMaze:*

Expanded Nodes (A\*): 221

Path Cost (A\*): 68

Optimal: Yes (this is the lowest path cost found)

*bigMaze:*

Expanded Nodes (A\*): 549

Path Cost (A\*): 210

Optimal: Yes (this is the lowest path cost found)

I believe that A\* search worked best for this maze-solving problem because it constantly expanded fewer nodes than BFS while still finding the optimal path, which makes it more efficient. Its use of the Manhattan heuristic helped guide the search more effectively compared to DFS, which found suboptimal paths in some cases.

**Depth First Search full result:**

tinyMaze:

[SearchAgent] using function depthFirstSearch

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (DFS): 15**

**Path Cost (DFS): 10**

Path found with total cost of 10 in 0.0 seconds

Search nodes expanded: 15

Pacman emerges victorious! Score: 500

Average Score: 500.0

Scores: 500.0

Win Rate: 1/1 (1.00)

Record: Win

mediumMaze:

[SearchAgent] using function depthFirstSearch

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (DFS): 146**

**Path Cost (DFS): 130**

Path found with total cost of 130 in 0.0 seconds

Search nodes expanded: 146

Pacman emerges victorious! Score: 380

Average Score: 380.0

Scores: 380.0

Win Rate: 1/1 (1.00)

Record: Win

bigMaze:

[SearchAgent] using function depthFirstSearch

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (DFS): 390**

**Path Cost (DFS): 210**

Path found with total cost of 210 in 0.0 seconds

Search nodes expanded: 390

Pacman emerges victorious! Score: 300

Average Score: 300.0

Scores: 300.0

Win Rate: 1/1 (1.00)

Record: Win

**Breadth First Search full result:**

tinyMaze:

[SearchAgent] using function breadthFirstSearch

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (BFS): 15**

**Path Cost (BFS): 8**

Path found with total cost of 8 in 0.0 seconds

Search nodes expanded: 16

Pacman emerges victorious! Score: 502

Average Score: 502.0

Scores: 502.0

Win Rate: 1/1 (1.00)

Record: Win

mediumMaze:

[SearchAgent] using function breadthFirstSearch

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (BFS): 269**

**Path Cost (BFS): 68**

Path found with total cost of 68 in 0.0 seconds

Search nodes expanded: 275

Pacman emerges victorious! Score: 442

Average Score: 442.0

Scores: 442.0

Win Rate: 1/1 (1.00)

Record: Win

bigMaze:

[SearchAgent] using function breadthFirstSearch

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (BFS): 620**

**Path Cost (BFS): 210**

Path found with total cost of 210 in 0.0 seconds

Search nodes expanded: 620

Pacman emerges victorious! Score: 300

Average Score: 300.0

Scores: 300.0

Win Rate: 1/1 (1.00)

Record: Win

**AStar Search full result:**

tinyMaze:

[SearchAgent] using function aStarSearch and heuristic manhattanHeuristic

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (A\*): 14**

**Path Cost (A\*): 8**

Path found with total cost of 8 in 0.0 seconds

Search nodes expanded: 14

Pacman emerges victorious! Score: 502

Average Score: 502.0

Scores: 502.0

Win Rate: 1/1 (1.00)

Record: Win

mediumMaze:

[SearchAgent] using function aStarSearch and heuristic manhattanHeuristic

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (A\*): 221**

**Path Cost (A\*): 68**

Path found with total cost of 68 in 0.0 seconds

Search nodes expanded: 221

Pacman emerges victorious! Score: 442

Average Score: 442.0

Scores: 442.0

Win Rate: 1/1 (1.00)

Record: Win

bigMaze:

[SearchAgent] using function aStarSearch and heuristic manhattanHeuristic

[SearchAgent] using problem type PositionSearchProblem

**Expanded Nodes (A\*): 549**

**Path Cost (A\*): 210**

Path found with total cost of 210 in 0.0 seconds

Search nodes expanded: 549

Pacman emerges victorious! Score: 300

Average Score: 300.0

Scores: 300.0

Win Rate: 1/1 (1.00)

Record: Win