Project 1: Search with Pacman

M3. MAS Activity Single Search Agent

Team 3:

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- Alejandro Pozos Aguirre
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Profesores

- Gerardo Ariel Castillo García
- Sergio Ruiz Loza

Link to GitHub: GitHub Repository

In [ ]:
```
import sys
```

Question 1

In [ ]:
```
!{sys.executable} autograder.py -q q1
```

```
Starting on 11-17 at 17:40:57

Question q1
===========
*** PASS: test_cases\q1\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'D', 'C']
*** PASS: test_cases\q1\graph_bfs_vs_dfs.test
***     solution:               ['2:A->D', '0:D->G']
***     expanded_states:        ['A', 'D']
*** PASS: test_cases\q1\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q1\graph_manypaths.test
***     solution:               ['2:A->B2', '0:B2->C', '0:C->D', '2:D->E2', '0:E2->F', '0:F->G']
***     expanded_states:        ['A', 'B2', 'C', 'D', 'E2', 'F']
*** PASS: test_cases\q1\pacman_1.test
***     pacman layout:          mediumMaze
***     solution length: 130
***     nodes expanded:         146

### Question q1: 3/3 ###


Finished at 17:40:57

Provisional grades
==================
Question q1: 3/3
------------------
Total: 3/3

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation for alternative uses
  import imp
```

Question 2

In [ ]:
```
!{sys.executable} autograder.py -q q2
```

```
Starting on 11-17 at 17:40:57

Question q2
===========
*** PASS: test_cases\q2\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q2\graph_bfs_vs_dfs.test
***     solution:               ['1:A->G']
***     expanded_states:        ['A', 'B']
*** PASS: test_cases\q2\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q2\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']
*** PASS: test_cases\q2\pacman_1.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         269

### Question q2: 3/3 ###


Finished at 17:40:57

Provisional grades
==================
Question q2: 3/3
------------------
Total: 3/3

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation for alternative uses
  import imp
```

Question 3

In [ ]:
```
!{sys.executable} autograder.py -q q3
```

```
Starting on 11-17 at 17:40:57

Question q3
===========
*** PASS: test_cases\q3\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q3\graph_bfs_vs_dfs.test
***     solution:               ['1:A->G']
***     expanded_states:        ['A', 'B']
*** PASS: test_cases\q3\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q3\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']
*** PASS: test_cases\q3\ucs_0_graph.test
***     solution:               ['Right', 'Down', 'Down']
***     expanded_states:        ['A', 'B', 'D', 'C', 'G']
*** PASS: test_cases\q3\ucs_1_problemC.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         269
*** PASS: test_cases\q3\ucs_2_problemE.test
***     pacman layout:          mediumMaze
***     solution length: 74
***     nodes expanded:         260
*** PASS: test_cases\q3\ucs_3_problemW.test
***     pacman layout:          mediumMaze
***     solution length: 152
***     nodes expanded:         173
*** PASS: test_cases\q3\ucs_4_testSearch.test
***     pacman layout:          testSearch
***     solution length: 7
***     nodes expanded:         14
*** PASS: test_cases\q3\ucs_5_goalAtDequeue.test
***     solution:               ['1:A->B', '0:B->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C']

### Question q3: 3/3 ###


Finished at 17:40:57

Provisional grades
==================
Question q3: 3/3
------------------
Total: 3/3

Your grades are NOT yet registered.  To register your grades, make sure
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```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation for alternative uses
  import imp
```

Question 4

In [ ]:
```
!{sys.executable} autograder.py -q q4
```

```
Starting on 11-17 at 17:40:57

Question q4
===========
*** PASS: test_cases\q4\astar_0.test
***     solution:               ['Right', 'Down', 'Down']
***     expanded_states:        ['A', 'B', 'D', 'C', 'G']
*** PASS: test_cases\q4\astar_1_graph_heuristic.test
***     solution:               ['0', '0', '2']
***     expanded_states:        ['S', 'A', 'D', 'C']
*** PASS: test_cases\q4\astar_2_manhattan.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         221
*** PASS: test_cases\q4\astar_3_goalAtDequeue.test
***     solution:               ['1:A->B', '0:B->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q4\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q4\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']

### Question q4: 3/3 ###


Finished at 17:40:57

Provisional grades
==================
Question q4: 3/3
------------------
Total: 3/3

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to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the
imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation
for alternative uses
  import imp
```

Question 5

In [ ]:
```
!{sys.executable} autograder.py -q q5
```

```
Note: due to dependencies, the following tests will be run: q2 q5
Starting on 11-17 at 17:40:57

Question q2
===========
*** PASS: test_cases\q2\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q2\graph_bfs_vs_dfs.test
***     solution:               ['1:A->G']
***     expanded_states:        ['A', 'B']
*** PASS: test_cases\q2\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q2\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']
*** PASS: test_cases\q2\pacman_1.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         269

### Question q2: 3/3 ###


Question q5
===========
*** PASS: test_cases\q5\corner_tiny_corner.test
***     pacman layout:          tinyCorner
***     solution length:                28

### Question q5: 3/3 ###


Finished at 17:40:57

Provisional grades
==================
Question q2: 3/3
Question q5: 3/3
------------------
Total: 6/6

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation for alternative uses
  import imp
```

Question 6

In [ ]:
```
!{sys.executable} autograder.py -q q6
```

```
Note: due to dependencies, the following tests will be run: q4 q6
Starting on 11-17 at 17:40:57

Question q4
===========
*** PASS: test_cases\q4\astar_0.test
***     solution:               ['Right', 'Down', 'Down']
***     expanded_states:        ['A', 'B', 'D', 'C', 'G']
*** PASS: test_cases\q4\astar_1_graph_heuristic.test
***     solution:               ['0', '0', '2']
***     expanded_states:        ['S', 'A', 'D', 'C']
*** PASS: test_cases\q4\astar_2_manhattan.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         221
*** PASS: test_cases\q4\astar_3_goalAtDequeue.test
***     solution:               ['1:A->B', '0:B->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q4\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q4\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']

### Question q4: 3/3 ###


Question q6
===========
*** PASS: heuristic value less than true cost at start state
*** PASS: heuristic value less than true cost at start state
*** PASS: heuristic value less than true cost at start state
path: ['North', 'East', 'East', 'East', 'East', 'North', 'North', 'West', 'West', 'West', 'West', 'North', 'North',
'North', 'North', 'North', 'North', 'North', 'North', 'West', 'West', 'West', 'West', 'South', 'South', 'East', 'Eas
t', 'East', 'East', 'South', 'South', 'South', 'South', 'South', 'South', 'West', 'West', 'South', 'South', 'South',
'West', 'West', 'East', 'East', 'North', 'North', 'North', 'East', 'East', 'East', 'East', 'East', 'East', 'East', 'E
ast', 'South', 'South', 'East', 'East', 'East', 'East', 'East', 'North', 'North', 'East', 'East', 'North', 'North',
'East', 'East', 'North', 'North', 'East', 'East', 'East', 'East', 'South', 'South', 'South', 'South', 'East', 'East',
'North', 'North', 'East', 'East', 'South', 'South', 'South', 'South', 'South', 'North', 'North', 'North', 'North', 'N
orth', 'North', 'North', 'West', 'West', 'North', 'North', 'East', 'East', 'North', 'North']
path length: 106
*** PASS: Heuristic resulted in expansion of 901 nodes

### Question q6: 3/3 ###


Finished at 17:40:57

Provisional grades
==================
Question q4: 3/3
Question q6: 3/3
------------------
Total: 6/6

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to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the
imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation
for alternative uses
  import imp
```

Question 7

In [ ]:
```
!{sys.executable} autograder.py -q q7
```

```
Note: due to dependencies, the following tests will be run: q4 q7
Starting on 11-17 at 17:40:58

Question q4
===========
*** PASS: test_cases\q4\astar_0.test
***     solution:               ['Right', 'Down', 'Down']
***     expanded_states:        ['A', 'B', 'D', 'C', 'G']
*** PASS: test_cases\q4\astar_1_graph_heuristic.test
***     solution:               ['0', '0', '2']
***     expanded_states:        ['S', 'A', 'D', 'C']
*** PASS: test_cases\q4\astar_2_manhattan.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         221
*** PASS: test_cases\q4\astar_3_goalAtDequeue.test
***     solution:               ['1:A->B', '0:B->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q4\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q4\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']

### Question q4: 3/3 ###


Question q7
===========
*** PASS: test_cases\q7\food_heuristic_1.test
*** PASS: test_cases\q7\food_heuristic_10.test
*** PASS: test_cases\q7\food_heuristic_11.test
*** PASS: test_cases\q7\food_heuristic_12.test
*** PASS: test_cases\q7\food_heuristic_13.test
*** PASS: test_cases\q7\food_heuristic_14.test
*** PASS: test_cases\q7\food_heuristic_15.test
*** PASS: test_cases\q7\food_heuristic_16.test
*** PASS: test_cases\q7\food_heuristic_17.test
*** PASS: test_cases\q7\food_heuristic_2.test
*** PASS: test_cases\q7\food_heuristic_3.test
*** PASS: test_cases\q7\food_heuristic_4.test
*** PASS: test_cases\q7\food_heuristic_5.test
*** PASS: test_cases\q7\food_heuristic_6.test
*** PASS: test_cases\q7\food_heuristic_7.test
*** PASS: test_cases\q7\food_heuristic_8.test
*** PASS: test_cases\q7\food_heuristic_9.test
*** PASS: test_cases\q7\food_heuristic_grade_tricky.test
***     expanded nodes: 4137
***     thresholds: [15000, 12000, 9000, 7000]

### Question q7: 5/4 ###


Finished at 17:41:13

Provisional grades
==================
Question q4: 3/3
Question q7: 5/4
------------------
Total: 8/7

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.

d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the
imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation
for alternative uses
  import imp
```

Question 8

In [ ]:
```
!{sys.executable} autograder.py -q q8
```

```
Starting on 11-17 at 17:41:13

Question q8
===========
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_1.test
***     pacman layout:          Test 1
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_10.test
***     pacman layout:          Test 10
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_11.test
***     pacman layout:          Test 11
***     solution length:                2
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_12.test
***     pacman layout:          Test 12
***     solution length:                3
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_13.test
***     pacman layout:          Test 13
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_2.test
***     pacman layout:          Test 2
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_3.test
***     pacman layout:          Test 3
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_4.test
***     pacman layout:          Test 4
***     solution length:                3
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_5.test
***     pacman layout:          Test 5
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_6.test
***     pacman layout:          Test 6
***     solution length:                2
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_7.test
***     pacman layout:          Test 7
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_8.test
***     pacman layout:          Test 8
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_9.test
***     pacman layout:          Test 9
***     solution length:                1

### Question q8: 3/3 ###


Finished at 17:41:13
```

```
Provisional grades
==================
Question q8: 3/3
------------------
Total: 3/3

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation for alternative uses
  import imp
```

Summary

In [ ]:
```
!{sys.executable} autograder.py
```

```
Starting on 11-17 at 17:41:13

Question q1
===========
*** PASS: test_cases\q1\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'D', 'C']
*** PASS: test_cases\q1\graph_bfs_vs_dfs.test
***     solution:               ['2:A->D', '0:D->G']
***     expanded_states:        ['A', 'D']
*** PASS: test_cases\q1\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q1\graph_manypaths.test
***     solution:               ['2:A->B2', '0:B2->C', '0:C->D', '2:D->E2', '0:E2->F', '0:F->G']
***     expanded_states:        ['A', 'B2', 'C', 'D', 'E2', 'F']
*** PASS: test_cases\q1\pacman_1.test
***     pacman layout:          mediumMaze
***     solution length: 130
***     nodes expanded:         146

### Question q1: 3/3 ###


Question q2
===========
*** PASS: test_cases\q2\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q2\graph_bfs_vs_dfs.test
***     solution:               ['1:A->G']
***     expanded_states:        ['A', 'B']
*** PASS: test_cases\q2\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q2\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']
*** PASS: test_cases\q2\pacman_1.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         269

### Question q2: 3/3 ###


Question q3
===========
*** PASS: test_cases\q3\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q3\graph_bfs_vs_dfs.test
***     solution:               ['1:A->G']
***     expanded_states:        ['A', 'B']
*** PASS: test_cases\q3\graph_infinite.test
***     solution:               ['0:A->B', '1:B->C', '1:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q3\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']
*** PASS: test_cases\q3\ucs_0_graph.test
***     solution:               ['Right', 'Down', 'Down']
***     expanded_states:        ['A', 'B', 'D', 'C', 'G']
*** PASS: test_cases\q3\ucs_1_problemC.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         269
*** PASS: test_cases\q3\ucs_2_problemE.test
***     pacman layout:          mediumMaze
***     solution length: 74
***     nodes expanded:         260
*** PASS: test_cases\q3\ucs_3_problemW.test
***     pacman layout:          mediumMaze
***     solution length: 152
***     nodes expanded:         173
```

```
*** PASS: test_cases\q3\ucs_4_testSearch.test
***     pacman layout:          testSearch
***     solution length: 7
***     nodes expanded:         14
*** PASS: test_cases\q3\ucs_5_goalAtDequeue.test
***     solution:               ['1:A->B', '0:B->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C']

### Question q3: 3/3 ###


Question q4
===========
*** PASS: test_cases\q4\astar_0.test
***     solution:               ['Right', 'Down', 'Down']
***     expanded_states:        ['A', 'B', 'D', 'C', 'G']
*** PASS: test_cases\q4\astar_1_graph_heuristic.test
***     solution:               ['0', '0', '2']
***     expanded_states:        ['S', 'A', 'D', 'C']
*** PASS: test_cases\q4\astar_2_manhattan.test
***     pacman layout:          mediumMaze
***     solution length: 68
***     nodes expanded:         221
*** PASS: test_cases\q4\astar_3_goalAtDequeue.test
***     solution:               ['1:A->B', '0:B->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C']
*** PASS: test_cases\q4\graph_backtrack.test
***     solution:               ['1:A->C', '0:C->G']
***     expanded_states:        ['A', 'B', 'C', 'D']
*** PASS: test_cases\q4\graph_manypaths.test
***     solution:               ['1:A->C', '0:C->D', '1:D->F', '0:F->G']
***     expanded_states:        ['A', 'B1', 'C', 'B2', 'D', 'E1', 'F', 'E2']

### Question q4: 3/3 ###


Question q5
===========
*** PASS: test_cases\q5\corner_tiny_corner.test
***     pacman layout:          tinyCorner
***     solution length:                28

### Question q5: 3/3 ###


Question q6
===========
*** PASS: heuristic value less than true cost at start state
*** PASS: heuristic value less than true cost at start state
*** PASS: heuristic value less than true cost at start state
path: ['North', 'East', 'East', 'East', 'East', 'North', 'North', 'West', 'West', 'West', 'West', 'North', 'North',
'North', 'North', 'North', 'North', 'North', 'North', 'West', 'West', 'West', 'West', 'South', 'South', 'East', 'Eas
t', 'East', 'East', 'South', 'South', 'South', 'South', 'South', 'South', 'West', 'West', 'South', 'South', 'South',
'West', 'West', 'East', 'East', 'North', 'North', 'North', 'East', 'East', 'East', 'East', 'East', 'East', 'East', 'E
ast', 'South', 'South', 'East', 'East', 'East', 'East', 'East', 'North', 'North', 'East', 'East', 'North', 'North',
'East', 'East', 'North', 'North', 'East', 'East', 'East', 'East', 'South', 'South', 'South', 'South', 'East', 'East',
'North', 'North', 'East', 'East', 'South', 'South', 'South', 'South', 'South', 'North', 'North', 'North', 'North', 'N
orth', 'North', 'North', 'West', 'West', 'North', 'North', 'East', 'East', 'North', 'North']
path length: 106
*** PASS: Heuristic resulted in expansion of 901 nodes

### Question q6: 3/3 ###


Question q7
===========
*** PASS: test_cases\q7\food_heuristic_1.test
*** PASS: test_cases\q7\food_heuristic_10.test
*** PASS: test_cases\q7\food_heuristic_11.test
*** PASS: test_cases\q7\food_heuristic_12.test
*** PASS: test_cases\q7\food_heuristic_13.test
*** PASS: test_cases\q7\food_heuristic_14.test
*** PASS: test_cases\q7\food_heuristic_15.test
*** PASS: test_cases\q7\food_heuristic_16.test
*** PASS: test_cases\q7\food_heuristic_17.test
```

```
*** PASS: test_cases\q7\food_heuristic_2.test
*** PASS: test_cases\q7\food_heuristic_3.test
*** PASS: test_cases\q7\food_heuristic_4.test
*** PASS: test_cases\q7\food_heuristic_5.test
*** PASS: test_cases\q7\food_heuristic_6.test
*** PASS: test_cases\q7\food_heuristic_7.test
*** PASS: test_cases\q7\food_heuristic_8.test
*** PASS: test_cases\q7\food_heuristic_9.test
*** PASS: test_cases\q7\food_heuristic_grade_tricky.test
***     expanded nodes: 4137
***     thresholds: [15000, 12000, 9000, 7000]

### Question q7: 5/4 ###


Question q8
===========
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_1.test
***     pacman layout:          Test 1
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_10.test
***     pacman layout:          Test 10
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_11.test
***     pacman layout:          Test 11
***     solution length:                2
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_12.test
***     pacman layout:          Test 12
***     solution length:                3
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_13.test
***     pacman layout:          Test 13
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_2.test
***     pacman layout:          Test 2
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_3.test
***     pacman layout:          Test 3
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_4.test
***     pacman layout:          Test 4
***     solution length:                3
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_5.test
***     pacman layout:          Test 5
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_6.test
***     pacman layout:          Test 6
***     solution length:                2
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_7.test
***     pacman layout:          Test 7
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_8.test
```

```
***     pacman layout:          Test 8
***     solution length:                1
[SearchAgent] using function depthFirstSearch
[SearchAgent] using problem type PositionSearchProblem
*** PASS: test_cases\q8\closest_dot_9.test
***     pacman layout:          Test 9
***     solution length:                1

### Question q8: 3/3 ###


Finished at 17:41:31

Provisional grades
==================
Question q1: 3/3
Question q2: 3/3
Question q3: 3/3
Question q4: 3/3
Question q5: 3/3
Question q6: 3/3
Question q7: 5/4
Question q8: 3/3
------------------
Total: 26/25

Your grades are NOT yet registered.  To register your grades, make sure
to follow your instructor's guidelines to receive credit on your project.
```

```
d:\Documents\TAREA\5oSemestre\MultiAgentSystems\search\proj1-search-python3\autograder.py:17: DeprecationWarning: the
imp module is deprecated in favour of importlib and slated for removal in Python 3.12; see the module's documentation
for alternative uses
  import imp
```