CSC421 Assignment #1

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Question 01:

BreadthFirstTreeSearch: (cost=568.0, expansions=45) Timisoara Arad Sibiu Fagaras Bucharest

BreadthFirstGraphSearch: (cost=568.0, expansions=11) Timisoara Arad Sibiu Fagaras Bucharest

DepthFirstTreeSearch: (cost=1328.0, expansions=10) Timisoara Arad Timisoara Lugoj Timisoara Arad Sibiu Oradea Sibiu Fagaras Bucharest

DepthFirstGraphSearch: (cost=1001.0, expansions=12) Timisoara Lugoj Mehadia Drobeta Craiova Pitesti Rimnicu Sibiu Fagaras Bucharest

UniformCostTreeSearch: (cost=536.0, expansions=92) Timisoara Arad Sibiu Rimnicu Pitesti Bucharest

UniformCostGraphSearch: (cost=536.0, expansions=12) Timisoara Arad Sibiu Rimnicu Pitesti Bucharest

GreedyBestFirstTreeSearch: (cost=615.0, expansions=6) Timisoara Lugoj Mehadia Drobeta Craiova Pitesti Bucharest

GreedyBestFirstGraphSearch: (cost=615.0, expansions=6) Timisoara Lugoj Mehadia Drobeta Craiova Pitesti Bucharest

IterativeDeepeningTreeSearch: (cost=568.0, expansions=20) Timisoara Arad Sibiu Fagaras Bucharest

IterativeDeepeningGraphSearch: (cost=568.0, expansions=9) Timisoara Arad Sibiu Fagaras Bucharest

AstarTreeSearch: (cost=536.0, expansions=11) Timisoara Arad Sibiu Rimnicu Pitesti Bucharest

AstarGraphSearch: (cost=536.0, expansions=10) Timisoara Arad Sibiu Rimnicu Pitesti Bucharest

Question 2: by hand

Question 3:

BreadthFirstTreeSearch: (cost=11.0, expansions=13187) 3 3 1 0 0 0  1 3 0 2 0 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

BreadthFirstGraphSearch: (cost=11.0, expansions=14) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

DepthFirstTreeSearch: (cost=15.0, expansions=15) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

DepthFirstGraphSearch: (cost=11.0, expansions=11) 3 3 1 0 0 0  1 3 0 2 0 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

UniformCostTreeSearch: (cost=11.0, expansions=7941) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

UniformCostGraphSearch: (cost=11.0, expansions=14) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

GreedyBestFirstTreeSearch: (cost=23.0, expansions=46) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  1 3 0 2 0 1  3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  1 3 1 2 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

GreedyBestFirstGraphSearch: (cost=11.0, expansions=14) 3 3 1 0 0 0  1 3 0 2 0 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

IterativeDeepeningTreeSearch: (cost=11.0, expansions=7727) 3 3 1 0 0 0  1 3 0 2 0 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

IterativeDeepeningGraphSearch: (cost=11.0, expansions=11) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

Question 4:

BreadthFirstTreeSearch: (cost=23.0, expansions=72) 0 0 0  12 0 0  9 0 3  1 8 3

BreadthFirstGraphSearch: (cost=23.0, expansions=28) 0 0 0  12 0 0  4 8 0  1 8 3

DepthFirstTreeSearch: (cost=315.0, expansions=53) 0 0 0  0 8 0  0 8 3  12 8 3  0 8 3  0 0 3  3 0 0  0 0 3  12 0 3  12 0 0  12 0 3  0 0 3  0 0 0  0 8 0  0 0 0  0 0 3  0 3 0  12 3 0  12 0 0  0 0 0  0 8 0  12 8 0  0 8 0  0 8 3  0 0 3  0 0 0  12 0 0  9 0 3  12 0 0  12 8 0  12 8 3  12 0 3  12 3 0  7 8 0  7 8 3  0 8 3  3 8 0  0 8 0  8 0 0  0 8 0  0 0 0  0 0 3  3 0 0  0 0 3  0 0 0  0 0 3  0 3 0  0 0 3  0 0 0  0 0 3  12 0 3  12 0 0  4 8 0  1 8 3

DepthFirstGraphSearch: (cost=35.0, expansions=7) 0 0 0  0 0 3  0 3 0  12 3 0  12 0 3  12 0 0  9 0 3  1 8 3

UniformCostTreeSearch: (cost=17.0, expansions=168) 0 0 0  0 0 3  0 3 0  0 3 3  0 6 0  0 6 3  0 8 1

UniformCostGraphSearch: (cost=17.0, expansions=23) 0 0 0  0 0 3  0 3 0  0 3 3  0 6 0  0 6 3  0 8 1

GreedyBestFirstTreeSearch: (cost=181.0, expansions=64) 0 0 0  0 0 3  0 0 0  12 0 0  12 0 3  12 3 0  9 3 3  4 8 3  7 8 0  7 0 0  7 8 0  0 8 0  8 0 0  8 8 0  12 4 0  0 4 0  0 4 3  12 4 3  0 4 3  0 4 0  0 0 0  0 0 3  0 0 0  0 8 0  8 0 0  8 8 0  12 4 0  8 8 0  12 4 0  9 4 3  9 7 0  6 7 3  12 1 3

GreedyBestFirstGraphSearch: (cost=67.0, expansions=16) 0 0 0  12 0 0  12 8 0  12 8 3  0 8 3  0 8 0  0 5 3  3 5 0  8 0 0  8 8 0  5 8 3  12 1 3

AstarTreeSearch: (cost=17.0, expansions=196) 0 0 0  0 0 3  0 3 0  0 3 3  0 6 0  0 6 3  0 8 1

AstarGraphSearch: (cost=17.0, expansions=23) 0 0 0  0 0 3  0 3 0  0 3 3  0 6 0  0 6 3  0 8 1

IterativeDeepeningTreeSearch: (cost=23.0, expansions=19) 0 0 0  12 0 0  4 8 0  1 8 3

IterativeDeepeningGraphSearch: (cost=23.0, expansions=3) 0 0 0  12 0 0  9 0 3  1 8 3

Question 5:

BreadthFirstTreeSearch: (cost=11.0, expansions=8218) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

BreadthFirstGraphSearch: (cost=11.0, expansions=14) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

DepthFirstTreeSearch: (cost=55.0, expansions=55) 3 3 1 0 0 0  2 3 0 1 0 1  3 3 1 0 0 0  1 3 0 2 0 1  3 3 1 0 0 0  2 3 0 1 0 1  3 3 1 0 0 0  2 3 0 1 0 1  3 3 1 0 0 0  2 2 0 1 1 1  3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  2 2 0 1 1 1  2 3 1 1 0 0  2 2 0 1 1 1  3 3 1 0 0 0  2 3 0 1 0 1  3 3 1 0 0 0  2 3 0 1 0 1  3 3 1 0 0 0  2 3 0 1 0 1  3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  3 0 1 0 3 0  2 0 0 1 3 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  2 0 0 1 3 1  2 2 1 1 1 0  2 0 0 1 3 1  2 2 1 1 1 0  2 0 0 1 3 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  1 0 0 2 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  1 0 0 2 3 1  2 0 1 1 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

DepthFirstGraphSearch: (cost=11.0, expansions=11) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

UniformCostTreeSearch: (cost=11.0, expansions=8932) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

UniformCostGraphSearch: (cost=11.0, expansions=14) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

GreedyBestFirstTreeSearch: (cost=11.0, expansions=16) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

GreedyBestFirstGraphSearch: (cost=11.0, expansions=13) 3 3 1 0 0 0  1 3 0 2 0 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

AstarTreeSearch: (cost=11.0, expansions=582) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

AstarGraphSearch: (cost=11.0, expansions=13) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  1 1 1 2 2 0  0 0 0 3 3 1

IterativeDeepeningTreeSearch: (cost=11.0, expansions=7727) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1

IterativeDeepeningGraphSearch: (cost=11.0, expansions=12) 3 3 1 0 0 0  2 2 0 1 1 1  2 3 1 1 0 0  0 3 0 3 0 1  1 3 1 2 0 0  1 1 0 2 2 1  2 2 1 1 1 0  2 0 0 1 3 1  3 0 1 0 3 0  1 0 0 2 3 1  2 0 1 1 3 0  0 0 0 3 3 1