Assignment 1

1) **Iterative deepening search:**
    - The code for this search is present in the file ”ids.py”.
    - The input file is ‘test/ids_input.txt’
    - Remove the astar_input.txt file while running this as this takes a lot of time run.

Input:

Start state:

--000--

--0X0--

00XXX00

000X000

000X000

--000--

--000--

Output:

Moves made: [[9, 7], [23, 9], [10, 8], [7, 9], [4, 16]]

Number of nodes: 83

Memory utilized: 8300 bytes

Solution found at depth: 5

Time taken: 0.0260000228882 seconds

Observations

- This is an uninformed search and hence doesn’t use the knowledge of game’s goal state.
- The program took more time and space compared to informed searches like A * search.

2) A* search

- The code for this search is present in the file ”a_star.py”.
- The input file is ‘test/astar_input.txt’

Input:

Start state:

--X0X--

--XXX--

0000XX0

0XX0XX0

0XX0000

--XXX--

--X0X--

Output:

A-Star search with heuristics 1

Moves made: [[21, 7], [0, 8], [5, 3], [8, 6], [22, 8], [17, 5], [30, 22], [32, 24], [2, 10], [11, 9], [9, 7], [6, 8], [3, 15], [15, 27], [27, 29], [29, 17], [18, 16]]

Number of nodes: 99572

Memory utilized: 3584592 bytes

Time taken: 25.7889997959 seconds

A-Star search with heuristics 2

Moves made: [[0, 8], [32, 24], [11, 9], [2, 10], [21, 23], [30, 22], [14, 16], [9, 11], [11, 25], [17, 15], [28, 16], [25, 23], [23, 21], [8, 22], [21, 23], [23, 9], [4, 16]]

Number of nodes: 156

Memory utilized: 5616 bytes

Time taken: 0.0730001926422 seconds

Observations:

- Heuristics 1 is based on the number of pegs left on the board.
- Heuristics 2 is based on the distance of pegs from the center peg. This is more informed than Heuristics 1 as the final state just has a peg in the center.
- Memory utilized and time taken both are more in the case of Heuristics 1 and hence it is evident from the output that Heuristics 2 performs better than Heuristics 1.