Trace:

NOTE: \*I tried the original puzzle on the documentation, it took a long time to calculate it and for my own fear, I don’t think it worked properly with my program. I tried the sample trace that was shown on the documentation, and it worked flawlessly. Thus I posted it here:

``````````

Rashid Goshtasbi AI 8\-Puzzle Solver

Please choose an algorithms to use:

1. Uniform Cost Search

2. A\*, misplaced tile heuristic

3: A\*, Manhattan distance heuristic

4. Exit

Choice: 1

User choice: ucostSearch

8-Puzzle Game Developed by Rashid!

First choose "default" or "create your own" puzzle:

1. Default Puzzle:

['1', '2', '3']

['4', '8', ' ']

['7', '6', '5']

2. Create your own

Choice: 1

Starting Search...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 0

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', ' '], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 1

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', '6', ' ']]

Expand node with g(n) = 1

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | 5 |

| 7 | 6 | |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', ' ', '8'], ['7', '6', '5']]

Expand node with g(n) = 1

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 2 |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', ' ', '6']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | 5 |

| 7 | | 6 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '3'], ['4', '2', '8'], ['7', '6', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 3 |

| 4 | 2 | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '6', '8'], ['7', ' ', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 6 | 8 |

| 7 | | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], [' ', '4', '8'], ['7', '6', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| | 4 | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 2

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', ' '], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', '6', ' ']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | 5 |

| 7 | 6 | |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', ' ', '8'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '8', '2'], ['4', ' ', '3'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 8 | 2 |

| 4 | | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[[' ', '1', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| | 1 | 2 |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', ' '], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

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| 1 | 2 | |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

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Expanding...

[['1', '2', ' '], ['4', '8', '3'], ['7', '6', '5']]

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| 4 | 8 | 3 |

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Expand node with g(n) = 3

and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | 8 | 5 |

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[['1', '2', '3'], ['4', ' ', '8'], ['7', '6', '5']]

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and h(n) = 1 is:

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Expanding...

[['1', '2', '3'], ['4', ' ', '5'], ['7', '8', '6']]

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and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | | 5 |

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[['1', '2', '3'], ['4', '8', '5'], [' ', '7', '6']]

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and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | 8 | 5 |

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Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', '6', ' ']]

Expand node with g(n) = 3

and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | 8 | 5 |

| 7 | 6 | |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', ' ', '8'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | | 8 |

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Expanding...

[[' ', '1', '3'], ['4', '2', '8'], ['7', '6', '5']]

Expand node with g(n) = 3

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[['1', '2', '3'], ['4', '6', '8'], [' ', '7', '5']]

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and h(n) = 1 is:

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| | 7 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '6', '8'], ['7', '5', ' ']]

Expand node with g(n) = 3

and h(n) = 1 is:

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| 7 | 5 | |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[[' ', '2', '3'], ['1', '4', '8'], ['7', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| | 2 | 3 |

| 1 | 4 | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['7', '4', '8'], [' ', '6', '5']]

Expand node with g(n) = 3

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 7 | 4 | 8 |

| | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

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[['1', '2', '3'], ['4', ' ', '8'], ['7', '6', '5']]

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[['1', '2', ' '], ['4', '8', '3'], ['7', '6', '5']]

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and h(n) = 1 is:

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[['1', '2', '3'], ['4', ' ', '8'], ['7', '6', '5']]

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| 4 | | 8 |

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\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 2 |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

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and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', ' ', '6']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | 5 |

| 7 | | 6 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '3'], ['4', '2', '8'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 3 |

| 4 | 2 | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '6', '8'], ['7', ' ', '5']]

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[['1', '2', '3'], [' ', '4', '8'], ['7', '6', '5']]

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| 1 | 2 | 3 |

| | 4 | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 2 |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '8', '2'], ['4', '6', '3'], ['7', ' ', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 8 | 2 |

| 4 | 6 | 3 |

| 7 | | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '8', '2'], [' ', '4', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 8 | 2 |

| | 4 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '8', '2'], ['4', '3', ' '], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 8 | 2 |

| 4 | 3 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['4', '1', '2'], [' ', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 4 | 1 | 2 |

| | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 2 |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

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\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

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\_\_\_ \_\_\_ \_\_\_

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[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

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\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

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\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', ' ', '2'], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 2 |

| 4 | 8 | 3 |

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\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', ' '], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

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\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', ' ', '6']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | 5 |

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\_\_\_ \_\_\_ \_\_\_

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[['1', ' ', '3'], ['4', '2', '8'], ['7', '6', '5']]

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| 1 | | 3 |

| 4 | 2 | 8 |

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[['1', '2', '3'], ['4', '6', '8'], ['7', ' ', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 6 | 8 |

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Expanding...

[['1', '2', '3'], [' ', '4', '8'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

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and h(n) = 1 is:

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| 1 | 2 | 3 |

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| 7 | 6 | 5 |

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[['1', ' ', '3'], ['4', '2', '5'], ['7', '8', '6']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 3 |

| 4 | 2 | 5 |

| 7 | 8 | 6 |

\_\_\_ \_\_\_ \_\_\_

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[['1', '2', '3'], ['4', '8', '5'], ['7', ' ', '6']]

Expand node with g(n) = 4

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\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | 5 |

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[['1', '2', '3'], [' ', '4', '5'], ['7', '8', '6']]

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\_\_\_ \_\_\_ \_\_\_

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and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

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[['1', '2', '3'], ['4', '8', '5'], ['7', ' ', '6']]

Expand node with g(n) = 4

and h(n) = 1 is:

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and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

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[['1', '2', '3'], ['4', '8', '5'], ['7', ' ', '6']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

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[['1', ' ', '3'], ['4', '2', '8'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | | 3 |

| 4 | 2 | 8 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

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[['1', '2', '3'], ['4', '6', '8'], ['7', ' ', '5']]

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and h(n) = 1 is:

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| 1 | 2 | 3 |

| 4 | 6 | 8 |

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[['1', '2', '3'], [' ', '4', '8'], ['7', '6', '5']]

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Expand node with g(n) = 4

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | 3 |

| 4 | 8 | |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['4', '1', '3'], [' ', '2', '8'], ['7', '6', '5']]

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and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 4 | 1 | 3 |

| | 2 | 8 |

| 7 | 6 | 5 |

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Expanding...

[['2', ' ', '3'], ['1', '4', '8'], ['7', '6', '5']]

Expand node with g(n) = 4

and h(n) = 1 is:

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| 2 | | 3 |

| 1 | 4 | 8 |

| 7 | 6 | 5 |

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Expand node with g(n) = 4

and h(n) = 1 is:

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| 7 | 4 | 8 |

| 6 | | 5 |

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[['1', '2', ' '], ['4', '8', '3'], ['7', '6', '5']]

Expand node with g(n) = 5

and h(n) = 1 is:

\_\_\_ \_\_\_ \_\_\_

| 1 | 2 | |

| 4 | 8 | 3 |

| 7 | 6 | 5 |

\_\_\_ \_\_\_ \_\_\_

Expanding...

[['1', '2', '3'], ['4', '8', '5'], ['7', '6', ' ']]

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\_\_\_ \_\_\_ \_\_\_

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Expanding...

Goal State Reached

Number of nodes expanded: 509

Size of the queue: 328

Final State Depth: 5

Rashid Goshtasbi AI 8\-Puzzle Solver

Please choose an algorithms to use:

1. Uniform Cost Search

2. A\*, misplaced tile heuristic

3: A\*, Manhattan distance heuristic

4. Exit

Choice: