

2.1 Puzzle Solution

Solution to P1

iteration no. = 1

Current node has Puzzle State:

1	0	3
4	2	6
7	5	8

successFlag = false
open set =

iteration no. = 2

Current node has Puzzle State:

0	1	3
4	2	6
7	5	8

successFlag = false
open set =

iteration no. = 3

Current node has Puzzle State:

1	3	0
4	2	6
7	5	8

successFlag = false
open set =

iteration no. = 4

Current node has Puzzle State:

1	2	3
4	0	6
7	5	8

successFlag = false
open set =

iteration no. = 5

Current node has Puzzle State:

— | 4, 1, 3 | —
| 0, 2, 6 |
| 7, 5, 8 |

successFlag = false
open set =

iteration no. = 6

Current node has Puzzle State:

— | 1, 3, 6 | —
| 4, 2, 0 |
| 7, 5, 8 |

successFlag = false
open set =

iteration no. = 7

Current node has Puzzle State:

— | 1, 2, 3 | —
| 0, 4, 6 |
| 7, 5, 8 |

successFlag = false
open set =

iteration no. = 8

Current node has Puzzle State:

— | 1, 2, 3 | —
| 4, 6, 0 |
| 7, 5, 8 |

successFlag = false
open set =

iteration no. = 9

Current node has Puzzle State:

```
  | 1, 2, 3 |  
  | 4, 5, 6 |  
  | 7, 0, 8 |
```

successFlag = false
open set =

iteration no. = 10

Current node has Puzzle State:

```
  | 4, 1, 3 |  
  | 2, 0, 6 |  
  | 7, 5, 8 |
```

successFlag = false
open set =

iteration no. = 11

Current node has Puzzle State:

```
  | 4, 1, 3 |  
  | 7, 2, 6 |  
  | 0, 5, 8 |
```

successFlag = false
open set =

iteration no. = 12

Current node has Puzzle State:

```
  | 1, 3, 6 |  
  | 4, 0, 2 |  
  | 7, 5, 8 |
```

successFlag = false
open set =

iteration no. = 13

Current node has Puzzle State:

```
  | 1, 3, 6 |  
  | 4, 2, 8 |
```

| 7, 5, 0 |

successFlag = false

open set =

iteration no. = 14

Current node has Puzzle State:

| 0, 2, 3 |

| 1, 4, 6 |

| 7, 5, 8 |

successFlag = false

open set =

iteration no. = 15

Current node has Puzzle State:

| 1, 2, 3 |

| 7, 4, 6 |

| 0, 5, 8 |

successFlag = false

open set =

iteration no. = 16

Current node has Puzzle State:

| 1, 2, 0 |

| 4, 6, 3 |

| 7, 5, 8 |

successFlag = false

open set =

iteration no. = 17

Current node has Puzzle State:

| 1, 2, 3 |

| 4, 6, 8 |

| 7, 5, 0 |

successFlag = false

open set =

iteration no. = 18
Current node has Puzzle State:

 | 1, 2, 3 |
 | 4, 5, 6 |
 |_0, 7, 8_|

successFlag = false
open set =

iteration no. = 19
Current node has Puzzle State:

 | 1, 2, 3 |
 | 4, 5, 6 |
 |_7, 8, 0_|

successFlag = true

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Search Succeeds
Efficiency 0.21052632
Solution Path

Solution to P2

iteration no. = 1
Current node has Puzzle State:

 | 4, 1, 3 |
 | 7, 2, 5 |
 |_0, 8, 6_|

successFlag = false

iteration no. = 2
Current node has Puzzle State:

 | 4, 1, 3 |
 | 0, 2, 5 |
 |_7, 8, 6_|

successFlag = false

iteration no. = 3
Current node has Puzzle State:

— | 4, 1, 3 | —
| 7, 2, 5 |
|_ 8, 0, 6 _|

successFlag = false

iteration no. = 4
open is Current node has Puzzle State:

— | 0, 1, 3 | —
| 4, 2, 5 |
|_ 7, 8, 6 _|

successFlag = false

iteration no. = 5

Current node has Puzzle State:

— | 4, 1, 3 | —
| 2, 0, 5 |
|_ 7, 8, 6 _|

successFlag = false

iteration no. = 6
open is
Current node has Puzzle State:

— | 4, 1, 3 | —
| 7, 0, 5 |
|_ 8, 2, 6 _|

successFlag = false

iteration no. = 7
open is
Current node has Puzzle State:

— | 4, 1, 3 | —

| 7, 2, 5 |
|_ 8, 6, 0 _|

successFlag = false

iteration no. = 8
open is
Current node has Puzzle State:

— | 1, 0, 3 | —
| 4, 2, 5 |
|_ 7, 8, 6 _|

successFlag = false

iteration no. = 9
Current node has Puzzle State:

— | 4, 0, 3 | —
| 2, 1, 5 |
|_ 7, 8, 6 _|

successFlag = false

iteration no. = 10
Current node has Puzzle State:

— | 4, 1, 3 | —
| 2, 5, 0 |
|_ 7, 8, 6 _|

successFlag = false

iteration no. = 11
Current node has Puzzle State:

— | 4, 1, 3 | —
| 2, 8, 5 |
|_ 7, 0, 6 _|

successFlag = false

iteration no. = 12
Current node has Puzzle State:

— | 4, 1, 3 | —
| 0, 7, 5 |
| 8, 2, 6 |

successFlag = false

iteration no. = 13

Current node has Puzzle State:

— | 4, 0, 3 | —
| 7, 1, 5 |
| 8, 2, 6 |

successFlag = false

iteration no. = 14

Current node has Puzzle State:

— | 4, 1, 3 | —
| 7, 5, 0 |
| 8, 2, 6 |

successFlag = false

iteration no. = 15

Current node has Puzzle State:

— | 4, 1, 3 | —
| 7, 2, 0 |
| 8, 6, 5 |

successFlag = false

iteration no. = 16

Current node has Puzzle State:

— | 1, 3, 0 | —
| 4, 2, 5 |
| 7, 8, 6 |

successFlag = false

iteration no. = 17

Current node has Puzzle State:

```
  ┌ 1, 2, 3 ┐  
  │ 4, 0, 5 │  
  └ 7, 8, 6 ┘
```

successFlag = false

iteration no. = 18

Current node has Puzzle State:

```
  ┌ 0, 4, 3 ┐  
  │ 2, 1, 5 │  
  └ 7, 8, 6 ┘
```

successFlag = false

iteration no. = 19

Current node has Puzzle State:

```
  ┌ 4, 3, 0 ┐  
  │ 2, 1, 5 │  
  └ 7, 8, 6 ┘
```

successFlag = false

iteration no. = 20

Current node has Puzzle State:

```
  ┌ 4, 1, 0 ┐  
  │ 2, 5, 3 │  
  └ 7, 8, 6 ┘
```

successFlag = false

iteration no. = 21

Current node has Puzzle State:

```
  ┌ 4, 1, 3 ┐  
  │ 2, 5, 6 │  
  └ 7, 8, 0 ┘
```

successFlag = false

iteration no. = 22
Current node has Puzzle State:

```
  _ _  
| 4, 1, 3 |  
| 2, 8, 5 |  
|_ 0, 7, 6 _|
```

successFlag = false

iteration no. = 23
Current node has Puzzle State:

```
  _ _  
| 4, 1, 3 |  
| 2, 8, 5 |  
|_ 7, 6, 0 _|
```

successFlag = false
open set =

iteration no. = 24
Current node has Puzzle State:

```
  _ _  
| 0, 1, 3 |  
| 4, 7, 5 |  
|_ 8, 2, 6 _|
```

successFlag = false
open set =

iteration no. = 25
Current node has Puzzle State:

```
  _ _  
| 4, 1, 3 |  
| 8, 7, 5 |  
|_ 0, 2, 6 _|
```

successFlag = false
open set =

iteration no. = 26
Current node has Puzzle State:

```
  _ _  
| 0, 4, 3 |  
| 7, 1, 5 |
```

|_ 8, 2, 6 _|

successFlag = false

open set =

iteration no. = 27

Current node has Puzzle State:

— | 4, 3, 0 | —

| 7, 1, 5 |

|_ 8, 2, 6 _|

successFlag = false

open set =

iteration no. = 28

Current node has Puzzle State:

— | 4, 1, 0 | —

| 7, 5, 3 |

|_ 8, 2, 6 _|

successFlag = false

open set =

iteration no. = 29

Current node has Puzzle State:

— | 4, 1, 3 | —

| 7, 5, 6 |

|_ 8, 2, 0 _|

successFlag = false

open set =

iteration no. = 30

Current node has Puzzle State:

— | 4, 1, 3 | —

| 7, 0, 2 |

|_ 8, 6, 5 _|

successFlag = false

open set =

iteration no. = 31
Current node has Puzzle State:

| 4, 1, 0 |
| 7, 2, 3 |
| 8, 6, 5 |

successFlag = false
open set =

iteration no. = 32
Current node has Puzzle State:

| 1, 3, 5 |
| 4, 2, 0 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 33
Current node has Puzzle State:

| 1, 2, 3 |
| 0, 4, 5 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 34
Current node has Puzzle State:

| 1, 2, 3 |
| 4, 5, 0 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 35
Current node has Puzzle State:

| 1, 2, 3 |
| 4, 8, 5 |
| 7, 0, 6 |

successFlag = false
open set =

iteration no. = 36

Current node has Puzzle State:

| 2, 4, 3 |
| 0, 1, 5 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 37

Current node has Puzzle State:

| 4, 3, 5 |
| 2, 1, 0 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 38

Current node has Puzzle State:

| 4, 0, 1 |
| 2, 5, 3 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 39

Current node has Puzzle State:

| 4, 1, 3 |
| 2, 5, 6 |
| 7, 0, 8 |

successFlag = false
open set =

iteration no. = 40

Current node has Puzzle State:

4	1	3
0	8	5
2	7	6

successFlag = false
open set =

iteration no. = 41

Current node has Puzzle State:

4	1	3
2	8	0
7	6	5

successFlag = false
open set =

iteration no. = 42

Current node has Puzzle State:

1	0	3
4	7	5
8	2	6

successFlag = false
open set =

iteration no. = 43

Current node has Puzzle State:

4	1	3
8	7	5
2	0	6

successFlag = false
open set =

iteration no. = 44

Current node has Puzzle State:

```
  _  _  
| 7, 4, 3 |  
| 0, 1, 5 |  
|_8, 2, 6_|
```

successFlag = false
open set =

iteration no. = 45

Current node has Puzzle State:

```
  _  _  
| 4, 3, 5 |  
| 7, 1, 0 |  
|_8, 2, 6_|
```

successFlag = false
open set =

iteration no. = 46

Current node has Puzzle State:

```
  _  _  
| 4, 0, 1 |  
| 7, 5, 3 |  
|_8, 2, 6_|
```

successFlag = false
open set =

iteration no. = 47

Current node has Puzzle State:

```
  _  _  
| 4, 1, 3 |  
| 7, 5, 6 |  
|_8, 0, 2_|
```

successFlag = false
open set =

iteration no. = 48

Current node has Puzzle State:

```
  _  _  
| 4, 1, 3 |  
| 0, 7, 2 |
```

| 8, 6, 5 |

successFlag = false

open set =

iteration no. = 49

Current node has Puzzle State:

| 4, 0, 3 |

| 7, 1, 2 |

| 8, 6, 5 |

successFlag = false

open set =

iteration no. = 50

Current node has Puzzle State:

| 4, 1, 3 |

| 7, 6, 2 |

| 8, 0, 5 |

successFlag = false

open set =

iteration no. = 51

Current node has Puzzle State:

| 4, 0, 1 |

| 7, 2, 3 |

| 8, 6, 5 |

successFlag = false

open set =

iteration no. = 52

Current node has Puzzle State:

| 1, 3, 5 |

| 4, 0, 2 |

| 7, 8, 6 |

successFlag = false

open set =

iteration no. = 53
Current node has Puzzle State:

| 1, 3, 5 |
| 4, 2, 6 |
| 7, 8, 0 |

successFlag = false
open set =

iteration no. = 54
Current node has Puzzle State:

| 0, 2, 3 |
| 1, 4, 5 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 55
Current node has Puzzle State:

| 1, 2, 3 |
| 7, 4, 5 |
| 0, 8, 6 |

successFlag = false
open set =

iteration no. = 56
Current node has Puzzle State:

| 1, 2, 0 |
| 4, 5, 3 |
| 7, 8, 6 |

successFlag = false
open set =

iteration no. = 57
Current node has Puzzle State:

| 1, 2, 3 |
| 4, 5, 6 |
| _ 7, 8, 0 _ |

successFlag = true
Search Succeeds
Efficiency 0.12280702
Solution Path

Solution to P3

iteration no. = 146
urrent node has Puzzle State:

— —
| 1, 2, 3 |
| 5, 7, 6 |
| _ 4, 0, 8 _ |

successFlag = false
open set =

iteration no. = 147
Current node has Puzzle State:

— —
| 1, 2, 3 |
| 4, 5, 6 |
| _ 7, 0, 8 _ |

successFlag = false
open set =

iteration no. = 148
Current node has Puzzle State:

— —
| 5, 0, 3 |
| 2, 1, 6 |
| _ 4, 7, 8 _ |

successFlag = false
open set =

iteration no. = 149
Current node has Puzzle State:

— 2, 5, 3 —
| 4, 1, 6 |
| 7, 0, 8 |

successFlag = false
open set =

iteration no. = 150

Current node has Puzzle State:

— 2, 5, 3 —
| 1, 6, 8 |
| 4, 0, 7 |

successFlag = false
open set =

iteration no. = 151

Current node has Puzzle State:

— 2, 5, 3 —
| 0, 7, 6 |
| 1, 4, 8 |

successFlag = false
open set =

iteration no. = 152

Current node has Puzzle State:

— 2, 5, 3 —
| 1, 7, 0 |
| 4, 8, 6 |

successFlag = false
open set =

iteration no. = 153

Current node has Puzzle State:

— 3, 6, 8 —
| 2, 0, 5 |
| 1, 4, 7 |

successFlag = false
open set =

iteration no. = 154

.....

Too much steps, omitted
Current node has Puzzle State:

┌ 1, 2, 3 ┐
├ 4, 5, 6 │
└ 7, 8, 0 ┘

successFlag = true

=====
Search Succeeds
Efficiency 0.034883723
Solution Path