

Report File

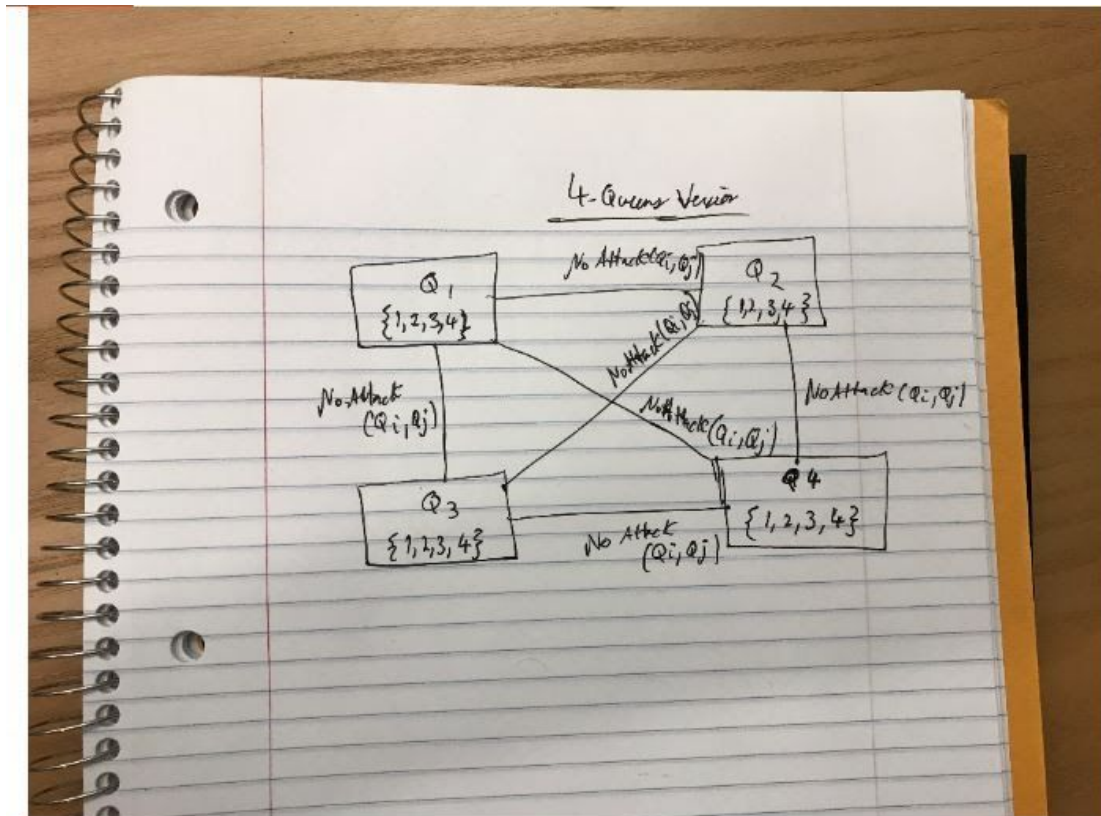
I) Discussion of all questions in Sec 3.1: This problem is formulated as a constraint satisfaction problem (Z, D, C) .

$Z = (Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7, Q_8)$ 8 queens

$D = (1, 2, 3, 4, 5, 6, 7, 8)$ and (A, B, C, D, E, F, G, H) rows and columns

$C = \text{Not attack}[Q_i, Q_j]$ where i and j are between 1 and 8 and equal to each other, this function is straightforward as it does not attack due to movement of the queens.

The next image is a constraint graph of the smaller 4 queens version of this problem.



The variables of this problem are the 8 queens being placed on the board. The domain of the queens as variables are the rows 1 through 8 and columns 1 through 8. The constraints of this problem are the board and its dimensions being 8×8 and the attacks of the queen covering the 8×8 board. These constraints determine the placement of the queen variables. This problem is also a binary CSP due to the queen variables being placed and is bounded by this. Next is the console outputs of the program for each queen placement:

II)

Queen at 1A:

8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 1

You have placed the first queen in row 1, column 1

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 17

Total number of backtracks in this solution with directional look ahead: 8

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 6

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 15

Total number of backtracks in this solution with directional look ahead: 7

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 14

Total number of backtracks in this solution with directional look ahead: 7

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 19

Total number of backtracks in this solution with directional look ahead: 9

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 87

Total number of backtracks in this solution with directional look ahead: 43

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 29

Total number of backtracks in this solution with directional look ahead: 14

Solution 9:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 22

Total number of backtracks in this solution with directional look ahead: 11

Solution 10:

The positions of the queens are:

Queen 1: Row 1, Column 1

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 15

Total number of backtracks in this solution with directional look ahead: 7

Queen at 1B:

8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 2

You have placed the first queen in row 1, column 2

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 6

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 41

Total number of backtracks in this solution with directional look ahead: 20

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 46

Total number of backtracks in this solution with directional look ahead: 23

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 8

Total number of backtracks in this solution with directional look ahead: 4

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 34

Total number of backtracks in this solution with directional look ahead: 17

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 24

Total number of backtracks in this solution with directional look ahead: 12

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 3

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 31

Total number of backtracks in this solution with directional look ahead: 15

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 19

Total number of backtracks in this solution with directional look ahead: 9

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 2

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 6

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 38

Total number of backtracks in this solution with directional look ahead: 19

Queen at 1C:

8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 3

You have placed the first queen in row 1, column 3

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 26

Total number of backtracks in this solution with directional look ahead: 13

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 24

Total number of backtracks in this solution with directional look ahead: 12

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 1

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 8

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 22

Total number of backtracks in this solution with directional look ahead: 11

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 11

Total number of backtracks in this solution with directional look ahead: 5

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 8

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 8

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 4

Total number of backtracks in this solution with directional look ahead: 2

Solution 9:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 8

Total number of backtracks in this solution with directional look ahead: 4

Solution 10:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 1

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 11:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 7

Total number of backtracks in this solution with directional look ahead: 3

Solution 12:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 4

Total number of backtracks in this solution with directional look ahead: 2

Solution 13:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 14:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 26

Total number of backtracks in this solution with directional look ahead: 13

Solution 15:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 16:

The positions of the queens are:

Queen 1: Row 1, Column 3

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 6

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 42

Total number of backtracks in this solution with directional look ahead: 21

Queen at 1D:

8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 4

You have placed the first queen in row 1, column 4

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 12

Total number of backtracks in this solution with directional look ahead: 6

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 3

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 4

Total number of backtracks in this solution with directional look ahead: 2

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 35

Total number of backtracks in this solution with directional look ahead: 17

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 1

Total number of backtracks in this solution with forward checking: 2

Total number of backtracks in this solution with directional look ahead: 1

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 16

Total number of backtracks in this solution with directional look ahead: 8

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 3

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 9:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 12

Total number of backtracks in this solution with directional look ahead: 6

Solution 10:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 11:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 6

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 7

Total number of backtracks in this solution with directional look ahead: 3

Solution 12:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 26

Total number of backtracks in this solution with directional look ahead: 13

Solution 13:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 3

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 14:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 8

Total number of backtracks in this solution with forward checking: 9

Total number of backtracks in this solution with directional look ahead: 4

Solution 15:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 6

Queen 7: Row 7, Column 8

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 16:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 14

Total number of backtracks in this solution with directional look ahead: 7

Solution 17:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 9

Total number of backtracks in this solution with directional look ahead: 4

Solution 18:

The positions of the queens are:

Queen 1: Row 1, Column 4

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 21

Total number of backtracks in this solution with directional look ahead: 10

Queen at 1E:

8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 5

You have placed the first queen in row 1, column 5

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 1

Total number of backtracks in this solution with directional look ahead: 0

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 21

Total number of backtracks in this solution with directional look ahead: 10

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 1

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 9

Total number of backtracks in this solution with directional look ahead: 4

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 3

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 14

Total number of backtracks in this solution with directional look ahead: 7

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 1

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 6

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 8

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 9

Total number of backtracks in this solution with directional look ahead: 4

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 26

Total number of backtracks in this solution with directional look ahead: 13

Solution 9:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 7

Total number of backtracks in this solution with directional look ahead: 3

Solution 10:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 11:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 6

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 12

Total number of backtracks in this solution with directional look ahead: 6

Solution 12:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 13:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 16

Total number of backtracks in this solution with directional look ahead: 8

Solution 14:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 8

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 15:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 8

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 2

Total number of backtracks in this solution with directional look ahead: 1

Solution 16:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 7

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 2

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 17:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 6

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 35

Total number of backtracks in this solution with directional look ahead: 17

Solution 18:

The positions of the queens are:

Queen 1: Row 1, Column 5

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 4

Total number of backtracks in this solution with directional look ahead: 2

Queen at 1F:
8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 6
You have placed the first queen in row 1, column 6

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 6
Queen 2: Row 2, Column 1
Queen 3: Row 3, Column 5
Queen 4: Row 4, Column 2
Queen 5: Row 5, Column 8
Queen 6: Row 6, Column 3
Queen 7: Row 7, Column 7
Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 10

Total number of backtracks in this solution with directional look ahead: 5

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 6
Queen 2: Row 2, Column 2
Queen 3: Row 3, Column 7
Queen 4: Row 4, Column 1
Queen 5: Row 5, Column 3
Queen 6: Row 6, Column 5
Queen 7: Row 7, Column 8
Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 42

Total number of backtracks in this solution with directional look ahead: 21

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 6
Queen 2: Row 2, Column 2
Queen 3: Row 3, Column 7
Queen 4: Row 4, Column 1
Queen 5: Row 5, Column 4
Queen 6: Row 6, Column 8
Queen 7: Row 7, Column 5
Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 26

Total number of backtracks in this solution with directional look ahead: 13

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 4

Total number of backtracks in this solution with directional look ahead: 2

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 7

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 8

Total number of backtracks in this solution with forward checking: 7

Total number of backtracks in this solution with directional look ahead: 3

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 4

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 7

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 9:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 4

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 8

Total number of backtracks in this solution with directional look ahead: 4

Solution 10:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 4

Total number of backtracks in this solution with directional look ahead: 2

Solution 11:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 12:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 11

Total number of backtracks in this solution with directional look ahead: 5

Solution 13:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 1

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 22

Total number of backtracks in this solution with directional look ahead: 11

Solution 14:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 3

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 8

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 15:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 7

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 5

Total number of backtracks in this solution with directional look ahead: 2

Solution 16:

The positions of the queens are:

Queen 1: Row 1, Column 6

Queen 2: Row 2, Column 8

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 4

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 5

Queen 8: Row 8, Column 3

Total number of backtracks in this solution with forward checking: 24

Total number of backtracks in this solution with directional look ahead: 12

Queen at 1G:
8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 7
You have placed the first queen in row 1, column 7

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 7
Queen 2: Row 2, Column 1
Queen 3: Row 3, Column 3
Queen 4: Row 4, Column 8
Queen 5: Row 5, Column 6
Queen 6: Row 6, Column 4
Queen 7: Row 7, Column 2
Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 6

Total number of backtracks in this solution with directional look ahead: 3

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 7
Queen 2: Row 2, Column 2
Queen 3: Row 3, Column 4
Queen 4: Row 4, Column 1
Queen 5: Row 5, Column 8
Queen 6: Row 6, Column 5
Queen 7: Row 7, Column 3
Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 38

Total number of backtracks in this solution with directional look ahead: 19

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 7
Queen 2: Row 2, Column 2
Queen 3: Row 3, Column 6
Queen 4: Row 4, Column 3
Queen 5: Row 5, Column 1
Queen 6: Row 6, Column 4
Queen 7: Row 7, Column 8
Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 19

Total number of backtracks in this solution with directional look ahead: 9

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 7

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 31

Total number of backtracks in this solution with directional look ahead: 15

Solution 5:

The positions of the queens are:

Queen 1: Row 1, Column 7

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 8

Queen 4: Row 4, Column 2

Queen 5: Row 5, Column 5

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 6

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 24

Total number of backtracks in this solution with directional look ahead: 12

Solution 6:

The positions of the queens are:

Queen 1: Row 1, Column 7

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 5

Queen 5: Row 5, Column 8

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 34

Total number of backtracks in this solution with directional look ahead: 17

Solution 7:

The positions of the queens are:

Queen 1: Row 1, Column 7

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 2

Queen 4: Row 4, Column 8

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 1

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 8

Total number of backtracks in this solution with directional look ahead: 4

Solution 8:

The positions of the queens are:

Queen 1: Row 1, Column 7

Queen 2: Row 2, Column 5

Queen 3: Row 3, Column 3

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 8

Queen 7: Row 7, Column 2

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 46

Total number of backtracks in this solution with directional look ahead: 23

Queen at 1H:

8 Queens Problem

Enter the position of the first queen within row 1(ex.columns 1-8): 8

You have placed the first queen in row 1, column 8

Solution 1:

The positions of the queens are:

Queen 1: Row 1, Column 8

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 4

Queen 4: Row 4, Column 1

Queen 5: Row 5, Column 7

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 3

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 31

Total number of backtracks in this solution with directional look ahead: 15

Solution 2:

The positions of the queens are:

Queen 1: Row 1, Column 8

Queen 2: Row 2, Column 2

Queen 3: Row 3, Column 5

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 1

Queen 6: Row 6, Column 7

Queen 7: Row 7, Column 4

Queen 8: Row 8, Column 6

Total number of backtracks in this solution with forward checking: 15

Total number of backtracks in this solution with directional look ahead: 7

Solution 3:

The positions of the queens are:

Queen 1: Row 1, Column 8

Queen 2: Row 2, Column 3

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 6

Queen 5: Row 5, Column 2

Queen 6: Row 6, Column 5

Queen 7: Row 7, Column 7

Queen 8: Row 8, Column 4

Total number of backtracks in this solution with forward checking: 22

Total number of backtracks in this solution with directional look ahead: 11

Solution 4:

The positions of the queens are:

Queen 1: Row 1, Column 8

Queen 2: Row 2, Column 4

Queen 3: Row 3, Column 1

Queen 4: Row 4, Column 3

Queen 5: Row 5, Column 6

Queen 6: Row 6, Column 2

Queen 7: Row 7, Column 7

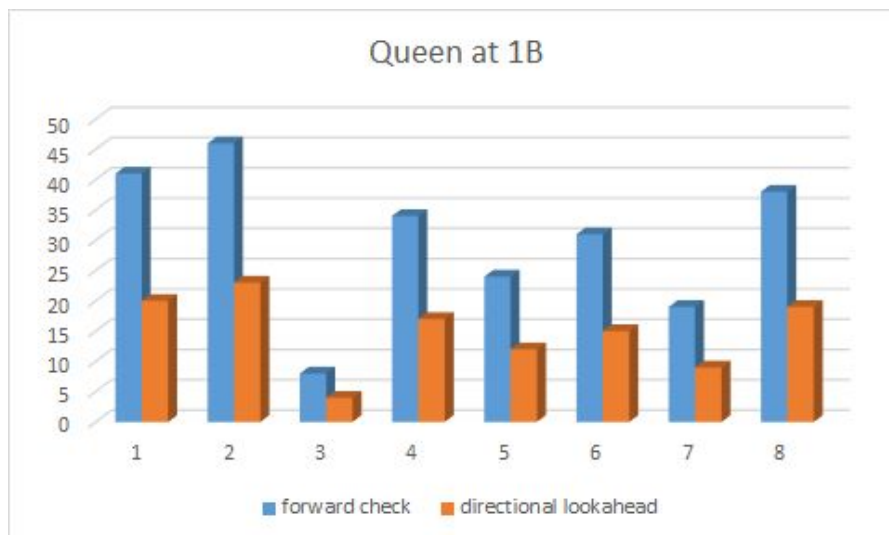
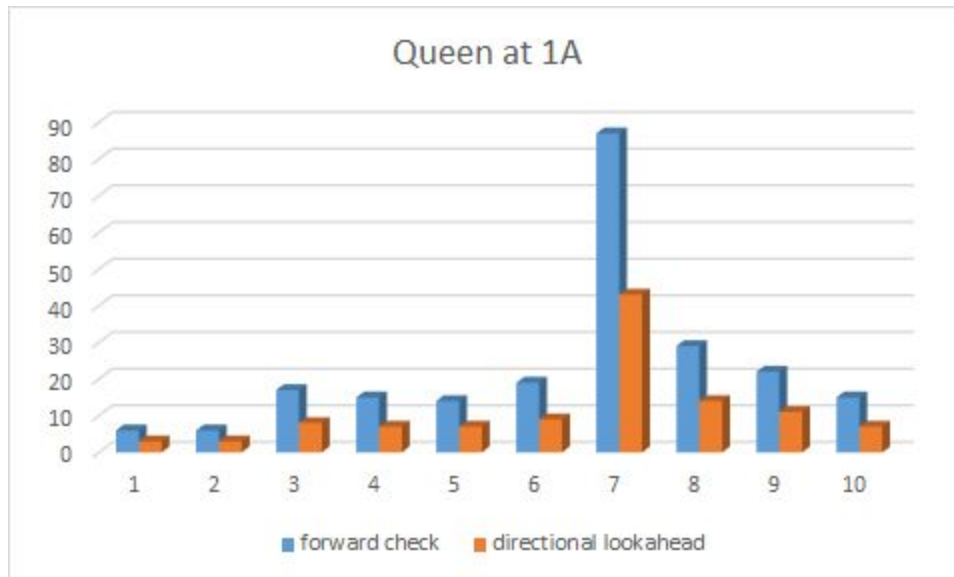
Queen 8: Row 8, Column 5

Total number of backtracks in this solution with forward checking: 29

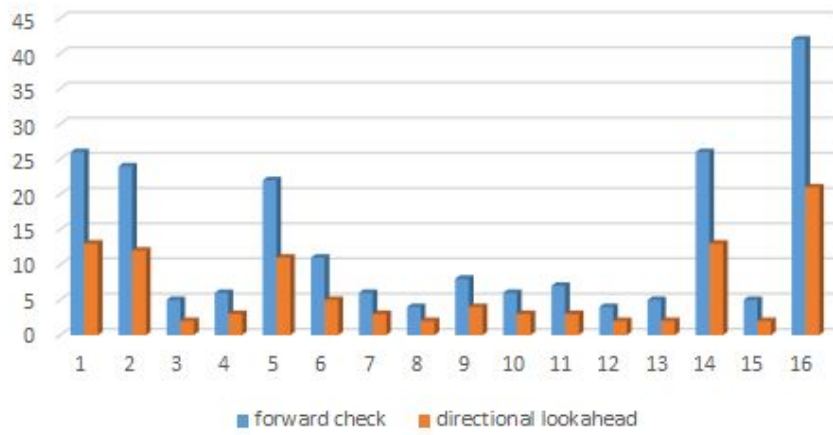
Total number of backtracks in this solution with directional look ahead: 14

The next part of this file is to display the histograms comparing forward check backtracking versus directional look ahead backtracking. These next graphs will display just this and as you can see directional look ahead has far less backtracks than forward checking. The solution number is on the horizontal axis and the number of backtracks is on the vertical axis

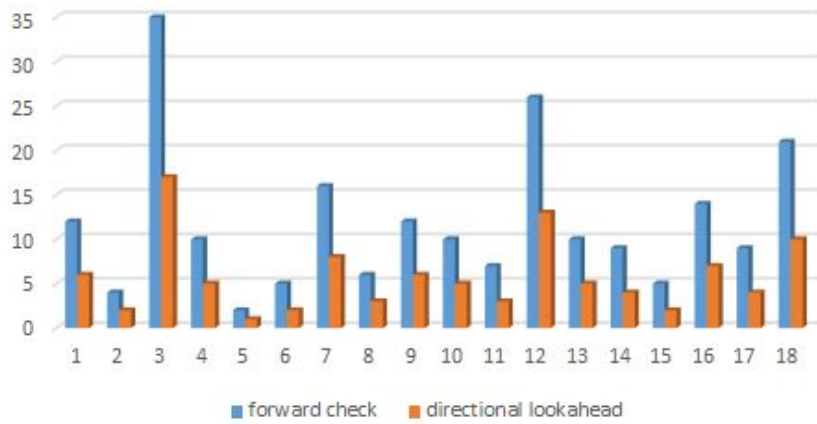
III)



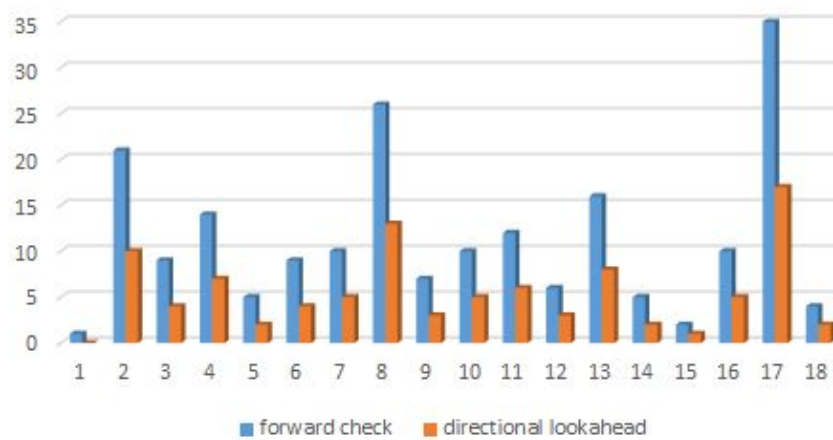
Queen at 1C



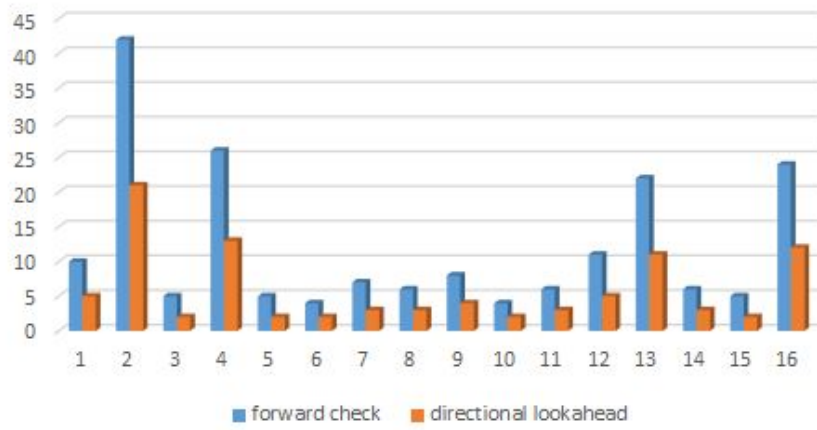
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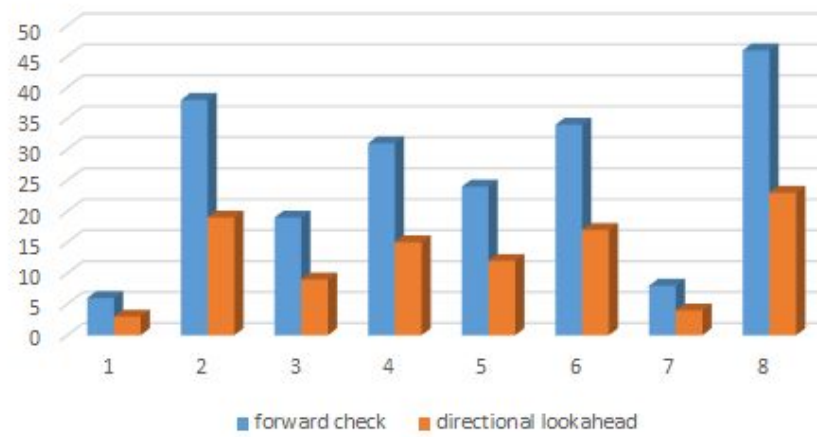
Queen at 1E



Queen at 1F



Queen at 1G



Queen at 1H

