Note the order in this program means the order of the Latin square so a Latin square of order n is an n × n grid filled with n symbols (1...n) so that each symbol appears once in each row and column.

Note also this special property of Latin squares: A reduced Latin square is one in which the first row is 1...n (in order) and the first column is likewise 1...n. The reduced Latin squares of order n are inequivalent because there is no way to permute one reduced Latin square to another without changing the order of the symbols in the first row and column

All other Latin squares of order n is equivalent to one of the reduced Latin squares because they can be reduced to that reduced Latin square by a permutation of the rows and/or a permutation of the columns.

How the main logic works using n=4 as example:

Depth first search with backtrack. First level starts with inserting value equal to n in the Latin squares. Then at each subsequent level, it will insert n-1, n-2, etc. in the Latin squares.

L4

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | 4 |
|  |  | 4 |  |
|  | 4 |  |  |
| 4 |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | 4 |
|  | 4 |  |  |
|  |  | 4 |  |
| 4 |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | 3 | 4 |
|  | 3 | 4 |  |
| 3 | 4 |  |  |
| 4 |  |  | 3 |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | 3 | 4 |
|  |  | 4 | 3 |
| 3 | 4 |  |  |
| 4 | 3 |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | 3 | 4 |
|  | 4 |  | 3 |
| 3 |  | 4 |  |
| 4 | 3 |  |  |

L3

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2 | 3 | 4 |
| 2 | 3 | 4 |  |
| 3 | 4 |  | 2 |
| 4 |  | 2 | 3 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2 | 3 | 4 |
| 2 |  | 4 | 3 |
| 3 | 4 | 2 |  |
| 4 | 3 |  | 2 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2 | 3 | 4 |
| 2 |  | 4 | 3 |
| 3 | 4 |  | 2 |
| 4 | 3 | 2 |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2 | 3 | 4 |
| 2 | 4 |  | 3 |
| 3 |  | 4 | 2 |
| 4 | 3 | 2 |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 2 | 4 | 1 | 3 |
| 3 | 1 | 4 | 2 |
| 4 | 3 | 2 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 2 | 3 | 4 | 1 |
| 3 | 4 | 1 | 2 |
| 4 | 1 | 2 | 3 |

L2

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 2 | 1 | 4 | 3 |
| 3 | 4 | 2 | 1 |
| 4 | 3 | 1 | 2 |

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | 2 | 3 | 4 |
| 2 | 1 | 4 | 3 |
| 3 | 4 | 1 | 2 |
| 4 | 3 | 2 | 1 |

L1