

# 10874 Segments

You are to find the length of the shortest path from the top to the bottom of a grid covering specified points along the way.

More precisely, you are given an  $n$  by  $n$  grid, rows  $1 \dots n$  and columns  $1 \dots n$  ( $1 \leq n \leq 20000$ ). On each row  $i$ , two points  $L(i)$  and  $R(i)$  are given where  $1 \leq L(i) \leq R(i) \leq n$ . You are to find the shortest distance from position  $(1, 1)$ , to  $(n, n)$  that visits all of the given segments in order. In particular, for each row  $i$ , all the points

$$(i, L(i)); (i, L(i) + 1), (i, L(i) + 2), \dots, (i, R(i)),$$

must be visited. Notice that one step is taken when dropping down between consecutive rows. Note that you can only move left, right and down (you cannot move up a level). On finishing the segment on row  $n$ , you are to go to position  $(n, n)$ , if not already there. The total distance covered is then reported.

### Input

Input file contains maximum 10 sets of inputs. The description of each set is given below:

The first line of each set consists of an integer  $n$ , the number of rows/columns on the grid. On each of the next  $n$  lines, there are two integers  $L(i)$  followed by  $R(i)$  (where  $1 \leq L(i) \leq R(i) \leq n$ ).

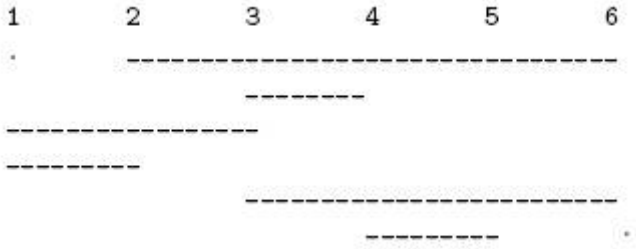
Input is terminated by a set whose value of  $n$  is zero. This input should not be processed.

### Output

For each set of input output is one integer, which is the length of the (shortest) path from  $(1, 1)$  to  $(n, n)$  which covers all intervals  $L(i), R(i)$ .

### Explanation of Sample Input/Output

Below is a pictorial representation of the input.



Notice that on the first row, we must traverse 5 units to the right and then drop down one level. On the second row, we must traverse 3 units to the left and drop down one level. On the third row, we must traverse 2 units to the left and drop down one level. On the fourth row, we move 1 unit to the right and then drop down one level. On the fifth row, we move 4 units to the right and drop down one level. On the sixth (and final) row, we move 2 units left, then 2 units right. In total, we have moved  $6 + 4 + 3 + 2 + 5 + 4 = 24$  units.

**Sample Input**

```
6
2 6
3 4
1 3
1 2
3 6
4 5
0
```

**Sample Output**

```
24
```