



USACO 2020 JANUARY CONTEST, GOLD

PROBLEM 3. SPRINGBOARDS

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English (en) ▼

Bessie is in a 2D grid where walking is permitted only in directions parallel to one of the coordinate axes. She starts at the point $(0, 0)$ and wishes to reach (N, N) ($1 \leq N \leq 10^9$). To help her out, there are P ($1 \leq P \leq 10^5$) springboards on the grid. Each springboard is at a fixed point (x_1, y_1) and if Bessie uses it, she will land at a point (x_2, y_2) .

Bessie is a progress-oriented cow, so she only permits herself to walk up or right, never left nor down. Likewise, each springboard is configured to never go left nor down. What is the minimum distance Bessie needs to walk?

SCORING:

- Test cases 2-5 satisfy $P \leq 1000$.
- Test cases 6-15 satisfy no additional constraints.

INPUT FORMAT (file boards.in):

The first line contains two space-separated integers N and P .

The next P lines each contains four integers, x_1, y_1, x_2, y_2 , where $x_1 \leq x_2$ and $y_1 \leq y_2$.

All springboard and target locations are distinct.

OUTPUT FORMAT (file boards.out):

Output a single integer, the minimum distance Bessie needs to walk to reach (N, N) .

SAMPLE INPUT:

```
3 2
0 1 0 2
1 2 2 3
```

SAMPLE OUTPUT:

```
3
```

Bessie's best path is:

- Bessie walks from $(0,0)$ to $(0,1)$ (1 unit).
- Bessie springs to $(0,2)$.
- Bessie walks from $(0,2)$ to $(1,2)$ (1 unit).
- Bessie springs to $(2,3)$.
- Bessie walks from $(2,3)$ to $(3,3)$ (1 unit).

The total walking length of Bessie's path is 3 units.

Problem credits: Pedro Paredes

