

Can of Wyrms

November 2024
C++ — 2 SEC — 512 MB

Only a fool would want to open up a can of worms. Only a soon-to-be-very-dead fool would want to open up a can of wyrms.

Deep below Mount Draco sprawls thousands of miles of dark, damp caves, known to all as the Can of Wyrms. Unfortunately for the most splendiferous spelunkers, these caverns are crawling with dragons, drakes, and wyverns of the most ferocious kinds. Unfortunately for *the most* splendiferous spelunker, she's just found herself lost somewhere inside.

The Can of Wyrms has a grid-like network of caves, connected by narrow tunnels. Each cave contains either a fire-breathing lizard or a helpful health potion (left behind by an unlucky adventurer). Our spelunker has found herself in the north-west corner of the caverns and must escape by the opening in the south-east corner. By rope or by hope, she must make her way through the caves in between, always heading to the east or to the south.

If she encounters a creature, she must fight it, reducing her health by its strength. If she encounters a health potion she will drink it, increasing her health by its potency. If her health ever falls below 1, she will become wyrm food.

Before making her perillous journey back to the surface, our spelunker would like to know the minimum health she needs to start with in order to escape.

INPUT You will be given two integers on a single line, **x** and **y**, specifying the dimensions of the Can of Wyrms. This will be followed by **y** lines of **x** integers, representing the contents of each cave.

A negative integer indicates that the cave contains a taloned reptile that must be fought. The absolute value of the number, **s**, gives the creature's strength.

A positive integer indicates that the cave contains a health potion. The number, **p**, gives the potion's potency.

Our spelunker starts in the top-left corner and must escape out of the bottom left corner. Neither of these caves contain dragons nor potions and so have the number 0.

$1 \leq x, y \leq 1,000$
 $1 \leq s, p \leq 1,000,000$

0	4	-7	3
-5	-9	2	1
2	5	-3	-8
-3	-4	8	0

OUTPUT Output the lowest possible health (at least 1) that our spelunker can start with and still escape the cave network (always moving to the south or east).

SAMPLE For example, suppose the Can of Wyrms is a 4 by 4 cave network, as depicted overleaf. The spelunker must have at least 5 health in order to escape, taking the route shown. As she travels along this path, her health changes: $5 \rightarrow 9 \rightarrow 2 \rightarrow 4 \rightarrow 1 \rightarrow 9$.

INPUT

```
4 4
0 4 -7 3
-5 -9 2 1
2 5 -3 -8
-3 -4 8 0
```

```
6 8
0 -501 -113 -793 -666 -16
-409 -96 399 140 113 -646
-955 204 -700 356 -934 -292
-835 -737 -752 -561 -190 -442
-1000 -316 -253 -210 -900 -127
83 284 12 -769 -827 -104
-598 -359 251 -52 111 -121
-12 461 -292 -244 -556 0
```

OUTPUT

```
5

1156
```

