D - Domino Covering XOR

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 425 points

Problem Statement

There is a grid with H rows and W columns. Let (i, j) denote the cell at the i-th row from the top $(1 \leq i \leq H)$ and the j-th column from the left $(1 \leq j \leq W)$.

Cell (i, j) $(1 \leq i \leq H, 1 \leq j \leq W)$ has a non-negative integer $A_{i,j}$ written on it.

Let us place zero or more dominoes on the grid. A domino covers two adjacent cells, namely one of the following pairs:

- cells (i, j) and $(i, j+1)$ for $1 \leq i \leq H, 1 \leq j < W$;
- cells (i, j) and $(i+1, j)$ for $1 \leq i < H, 1 \leq j \leq W$.

No cell may be covered by more than one domino.

For a placement of dominoes, define its **score** as the bitwise XOR of all integers written in cells **not** covered by any domino.

Find the maximum possible score.

▶ What is bitwise XOR?

Constraints

- $1 \leq H$
- $1 \leq W$
- $HW \leq 20$
- $0 \leq A_{i,j} < 2^{60}\ (1 \leq i \leq H,\ 1 \leq j \leq W)$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{array}{llll}
H & W & & \\
A_{1,1} & A_{1,2} & \dots & A_{1,W} \\
A_{2,1} & A_{2,2} & \dots & A_{2,W} \\
\vdots & & & \\
A_{H,1} & A_{H,2} & \dots & A_{H,W}
\end{array}
$$

Output

Output the answer.

Sample Input 1 Copy

```
3 4
1 2 3 8
4 0 7 10
5 2 4 2
```

Sample Output 1 Copy

```
15
```

The grid is as follows:

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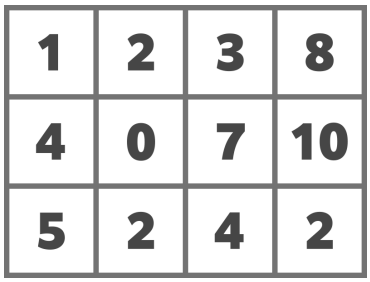
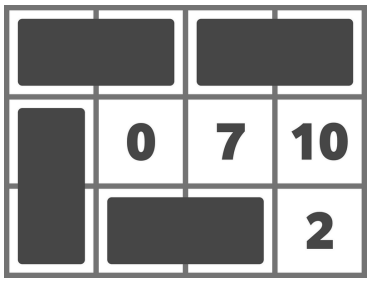


For example, the placement below yields a score of 15.



No placement achieves a score of 16 or higher, so output 15.

Sample Input 2 Copy

```
1 11
1 2 4 8 16 32 64 128 256 512 1024
```

Sample Output 2 Copy

```
2047
```

You may also choose to place no dominoes.

Sample Input 3 Copy

```
4 5
74832 16944 58683 32965 97236
52995 43262 51959 40883 58715
13846 24919 65627 11492 63264
29966 98452 75577 40415 77202
```

Sample Output 3 Copy

```
131067
```

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Language

Python (CPython 3.11.4)

Source Code

Open File | Customize | Toggle Editor | Auto Height

1

* at most 512 KiB

* Your source code will be saved as Main.*extension*.

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