2 - Haybale Feast (Again!)

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Haybale Feast (Again!)

Time Limit: 3.0s
Memory Limit: 256MB
Input: stdin
Output: stdout

When submitting, please check that the problem listed (on the Submission page where you upload your solution) matches the problem you intend to submit.

Finally out of quarantine, Bessie decides to have a large feast of hay in Farmer John's farm.

The farm can be represented as an $N \times M$ grid of squares, where N is the number of rows and M is the number of columns ($1 \leq N \leq 500$, $1 \leq M \leq 500$). Each square has a "tastiness value," which is a positive integer in the range $[1, 5000]$ if there exists a hay bale at that square or 0 if there does not.

Bessie wishes to select some axis-aligned rectangles such that

- All selected rectangles are filled with haybales. In other words, no selected rectangle contains a 0.

- No two selected rectangles contain squares from the same column.

Find the maximum total tastiness of all squares in rectangles chosen by Bessie if she chooses exactly i rectangles for each $i \in [1, M]$. If it is impossible for Bessie to choose exactly i rectangles, then output -1 instead.

INPUT FORMAT (pipe stdin):

The first line contains N and M.

The next N rows each contain M integers denoting the tastiness values of each square on the farm.

OUTPUT FORMAT (pipe stdout):

Print M lines. The i-th line should contain the maximum total tastiness if Bessie chooses exactly i rectangles or -1 if this is impossible.

Input	Output

```
5 7
1 1 0 1 1 1 0
1 1 0 4 1 1 0
1 1 0 0 1 1 0
1 1 1 1 1 1 0
1 1 1 1 1 1 0
```

```
12
20
25
27
27
27
-1
```

For $i = 1$, Bessie can pick the bottom-left 2×6 rectangle.

For $i = 2$, Bessie can pick two 5×2 rectangles filled with ones.

For $i = 3$, Bessie can pick the same rectangles as in $i = 2$ as well as a rectangle containing 1 and 4.

For $i = 4$, Bessie can pick the same rectangles as in $i = 3$ as well as a rectangle containing two ones.

There is no way for Bessie to pick exactly 7 rectangles because the last column contains no hay bales.

SCORING:

- For 20% of points, $N, M \leq 10$.

- For 30% of points, $N, M \leq 100$.

- For 50% of points, no additional constraints.

May 2, 2021, 4:23 pm EDT