Crosslink

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

The flow of light began to drift apart, and in response, people built bridges to span the widening distances. To reunite the fractured island, they raised structures that reached from its heart to its farthest edges.

The final structure meant to complete this reconnection was called **Crosslink**—but the bridge was never finished.

Follow the remnants of the broken flow they once sought to unite, and restore the bridge that was left incomplete.

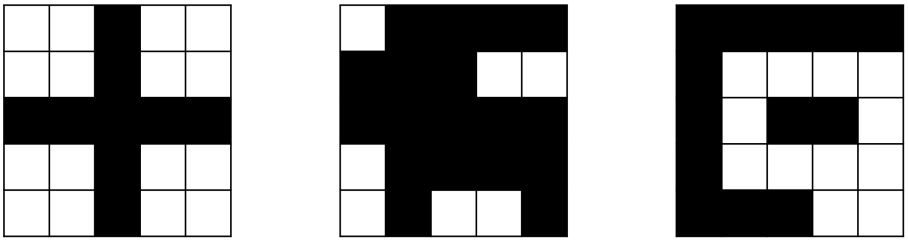
On the island, there is a grid of size $N \times M$. The cell at the r-th row from the top and c-th column from the left is denoted as (r, c).

Some of the NM cells already contain land. People want to add more land to form a crosslink—a connected group of land cells that touches all four edges of the grid: top, bottom, left, and right.

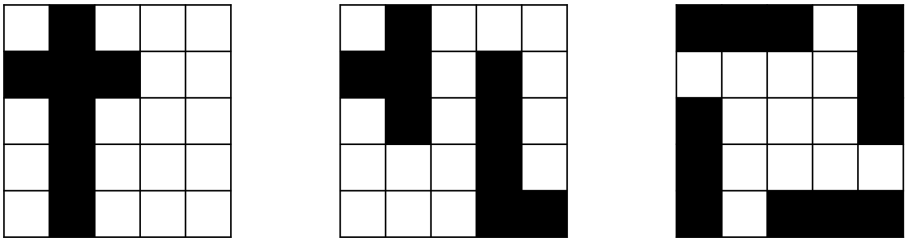
Formally, a set of grid cells S is considered a crosslink if it satisfies the following conditions:

- Every cell $(r, c) \in S$ contains land.
- For any two distinct grid cells $a, b \in S$, there exists a path $a = p_1 \to p_2 \to \cdots \to p_k = b$ such that $\{p_1, p_2, \cdots, p_k\} \subset S$ and p_i and p_{i+1} are adjacent in the up, down, left, or right directions. $(1 \le i \le k - 1)$
- There exists an integer c $(1 \le c \le M)$ such that $(1, c) \in S$.
- There exists an integer c $(1 \le c \le M)$ such that $(N, c) \in S$.
- There exists an integer r $(1 \le r \le N)$ such that $(r, 1) \in S$.
- There exists an integer r $(1 \le r \le N)$ such that $(r, M) \in S$.

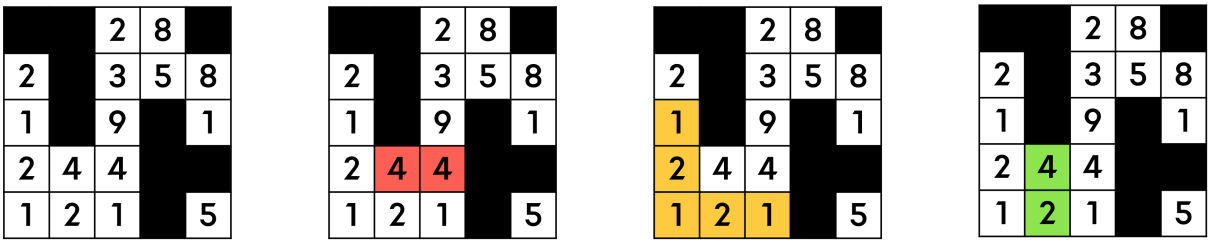
The illustration below shows an example of a grid that contains a valid crosslink. Shaded cells represent land, while unshaded cells represent empty spaces. As demonstrated in the third example, not all land cells need to be part of the crosslink.



The next set of three grids does not contain a crosslink. For example, in the third grid, there is no starting point from which both the left and right edges can be reached, so it does not contain a crosslink.



The cost of placing new land may vary depending on the location. Consider the following example:



In the leftmost image, black cells represent existing land, while the numbers in the unshaded cells indicate the cost of placing new land in those positions.

By adding land as shown in red, a crosslink can be formed at a total cost of $4 + 4 = 8$. However, placing land as shown in yellow forms a valid crosslink at a lower total cost of $1 + 2 + 1 + 2 + 1 = 7$, which is the minimum cost in this case. On the other hand, placing land as shown in green only costs $4 + 2 = 6$, but since it does not contain a crosslink, it is not a valid solution.

The islanders want to find the minimum total cost required to place land and form a valid crosslink.

Input

The first line contains two integers N, M representing the size of the grid.

Following this, N lines are provided, each containing characters $C_{i1}, C_{i2}, \cdots, C_{iM}$ representing the state of the grid. The meanings of the characters are as follows:

- If C_{ij} is `0`, cell (i, j) already contains land.
- If C_{ij} is a digit from `1` to `9`, cell (i, j) is empty, and the cost of placing land is the corresponding digit.
- If C_{ij} is one of the uppercase letters from `A` to `Z`, cell (i, j) is empty, and the cost of placing land is $10, 11, \cdots, 35$, respectively.

- $2 \leq N \leq 1000$
- $2 \leq M \leq 1000$
- C_{ij} is a digit or an uppercase letter $(1 \leq i \leq N, 1 \leq j \leq M)$

Output

Output the minimum cost required to place land to create a crosslink.

Scoring

- Subtask 1 (8 points): $N \leq 4, M \leq 4$

- Subtask 2 (3 points): C_{ij} = '1' $(1 \leq i \leq N, 1 \leq j \leq M)$
- Subtask 3 (11 points): For even i, C_{ij} = '0' $(1 \leq i \leq N, 1 \leq j \leq M)$
- Subtask 4 (42 points): $N \leq 100, M \leq 100$
- Subtask 5 (18 points): $N \leq 700, M \leq 700$
- Subtask 6 (18 points): No additional constraints.

Examples

standard input	standard output
5 5 00280 20358 10901 24400 12105	7
5 7 QTVPU0Z 02X010Y Y0R2T0X Z301Y40 W0PUXVZ	13