Problem J. Most Similar Words

Time limit 2000 ms
Mem limit 262144 kB

You are given n words of **equal** length m, consisting of lowercase Latin alphabet letters. The i-th word is denoted s_i.

In one move you can choose **any position in any single word** and change the letter at that position to the previous or next letter in alphabetical order. For example:

- you can change 'e' to 'd' or to 'f';
- 'a' can only be changed to 'b';
- 'z' can only be changed to 'y'.

The *difference* between two words is the **minimum** number of moves required to make them equal. For example, the *difference* between "best" and "cost" is $1 + 10 + 0 + 0 = 11$.

Find the minimum *difference* of s_i and s_j such that $(i < j)$. In other words, find the minimum *difference* over all possible pairs of the n words.

Input

The first line of the input contains a single integer t ($1 \le t \le 100$) — the number of test cases. The description of test cases follows.

The first line of each test case contains 2 integers n and m ($2 \le n \le 50, 1 \le m \le 8$) — the number of strings and their length respectively.

Then follows n lines, the i-th of which containing a single string s_i of length m, consisting of lowercase Latin letters.

Output

For each test case, print a single integer — the minimum *difference* over all possible pairs of the given strings.

Examples

Input	Output
6 2 4 best cost 6 3 abb zba bef cdu ooo zzz 2 7 aaabbbc bbaezfe 3 2 ab ab ab 2 8 aaaaaaaa zzzzzzzz 3 1 a u y	11 8 35 0 200 4

Note

For the second test case, one can show that the best pair is ("abb","bef"), which has *difference* equal to 8, which can be obtained in the following way: change the first character of the first string to 'b' in one move, change the second character of the second string to 'b' in 3 moves and change the third character of the second string to 'b' in 4 moves, thus making in total $1 + 3 + 4 = 8$ moves.

For the third test case, there is only one possible pair and it can be shown that the minimum amount of moves necessary to make the strings equal is 35.

For the fourth test case, there is a pair of strings which is already equal, so the answer is 0.