Norte da Universidade

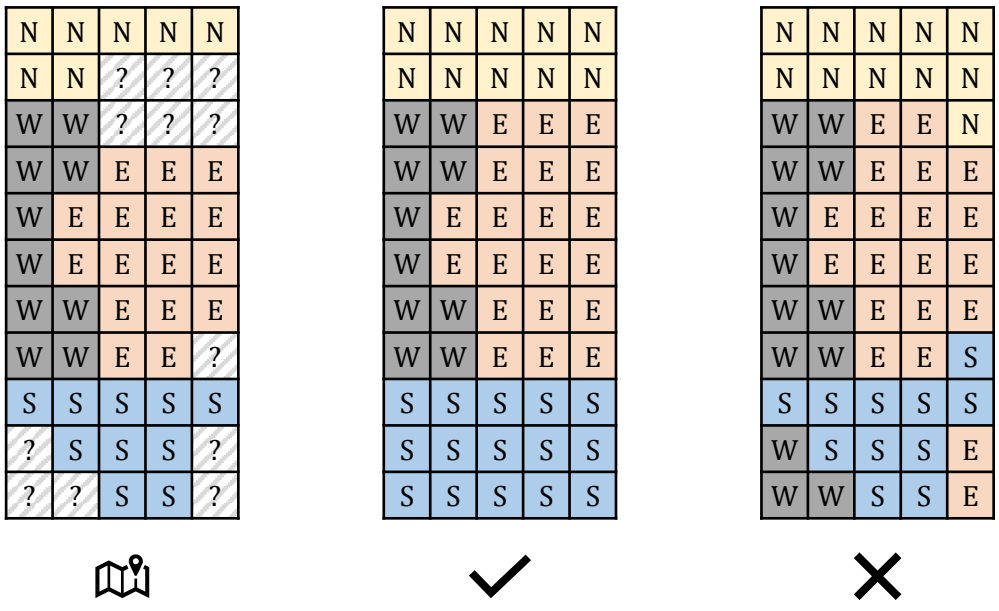
Input file:	`standard input`
Output file:	`standard output`
Time limit:	8 seconds
Memory limit:	1024 megabytes

Some universities use a coordinate system to name the buildings on their campus: divide the campus into north, south, west, and east regions, then assign an ordinal number to each building to enumerate and identify them. Due to historical or geographical reasons, some regions may not be connected or may not exist at all. The only rules to ensure the system's consistency are:

- To the due north of each building in the north region (N), every building should belong to the north region.
- To the due south of each building in the south region (S), every building should belong to the south region.
- To the due east of each building in the east region (E), every building should belong to the east region.
- To the due west of each building in the west region (W), every building should belong to the west region.

Today, Aki visited a university that applies the same naming rules. After wandering around the campus in the afternoon, he discovered that the buildings in the university are aligned in an $n \times m$ grid, with exactly one building located at each cell. Aki visited some of the buildings, while the others remain unknown. Aki is curious about the possible number of layouts of the university based on his current knowledge. Two layouts are considered different if there exists a building belonging to different regions.

See the following figure illustrating the first sample. For the puzzle shown on the left, the layout in the middle is a valid solution, while the layout on the right is invalid because there are cells violating the rules. For example, the last three cells in the third row violate the third rule, which states that all buildings to the due east of a building in the east region should belong to the east region.



Solve Aki's task. As the answer may be large, only the answer modulo 998244353 is desired.

Input

The input consists of multiple test cases. The first line contains an integer T ($1 \leq T \leq 100$), the number of test cases. For each test case:

- The first line contains two integers n and m ($1 \leq n, m \leq 1000$), the sizes of the map. The map is n rows from north to south, and m columns from west to east. The upper left corner is the north west corner.
- The next n lines each contain a string of length m. Each character should be `N`, `S`, `W`, `E`, or `?`.

It's guaranteed that the sum of $n \times m$ does not exceed 2×10^6.

Output

For each test case, print the number, modulo 998244353, of possible layouts in a line.

Example

standard input	standard output
5 11 5 NNNNN NN??? WW??? WWEEE WEEEE WEEEE WWEEE WWEE? SSSSS ?SSS? ??SS? 2 7 ??S?N?? ??S?N?? 3 4 W??E WEEE ?E?? 2 2 ?? ?? 3 3 ??? ??? ???	26 1587 18 56 1112