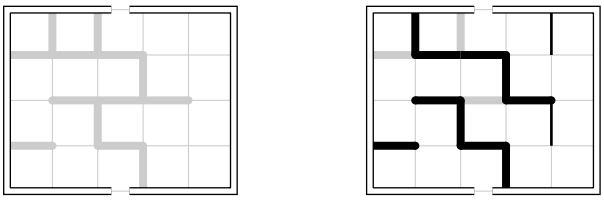
Task: ZYW
Hedge

Olimpiada Informatyczna

XXIII OI, Stage III, Day 1. Source file `zyw.*` Available memory: 128 MB. *13.04.2016*

The royal gardener Byteasar is to grow a hedge maze in the royal garden. Byteasar decided to partition the rectangular garden into $m \times n$ square tiles. The garden's perimeter is walled, with only two entrances in the middle of its north and south side. At each side between two tiles, a hedgerow segment of either cypress or thuja can be planted. The king prefers cypress, which unfortunately requires quality soil, and therefore cannot be planted everywhere. Byteasar has every intention to please the king by maximizing the number of cypress hedgerow segments.

The hedge forms a maze if it satisfies the following condition: every tile can be reached in a unique way from both entrances. (A move is possible between two adjacent tiles if there is no hedge on their shared side. Two routes differ if they lead through different sets of tiles.)



The left part of the figure above depicts a sample garden with $m = 4$ and $n = 5$, which has 31 shared sides. 13 of those, where cypress can be planted, have been marked.

The right part of the figure depicts a sample maze consisting of 12 hedgerow segments, 10 of which are cypress and 2 of which are thuja. There is no maze with more cypress segments. Your task is writing a program that will aid Byteasar in designing the maze.

Input

There are two integers m and n in the first line of the standard input, specifying the garden's dimensions ($2 \leq m, n$ and n is odd). Each of the following m lines contains $n - 1$ characters, describing the inner vertical tile sides, row by row, from left to right. A character `C` indicates that cypress (or thuja) can be planted on that side, whereas `T` indicates that only thuja can be planted. The next $m - 1$ lines, containing n characters each, describe the inner horizontal tile sides, also row by row, from left to right.

Output

In the first line of the standard output, two integers should be printed: the number of hedgerow segments to form the maze and the maximal number of cypress segments among those. The $2m - 1$ lines that follow are to describe the maze's hedgerow segments, in the format used for the input. The character `Z` should be printed if the tile side has hedgerow segment planted and the character `.` (full stop/period) otherwise.

If several solutions satisfy the king's requirements, any of those can be printed.

Example

For the following input data:	one of the correct results is:
`4 5`	`12 10`
`CCTT`	`Z..Z`
`TTCT`	`..Z.`
`TCTT`	`.Z.Z`
`TTCT`	`..Z.`
`CCCTT`	`.ZZ..`
`TCCCT`	`.Z.Z.`
`CTCTT`	`Z.Z..`

Explanation of the example: The input describes the garden from the left side of the figure; the result describes the maze from its right side.

Sample Grading Tests:

`1ocen:` $m = 4$, $n = 3$, cypress can be planted everywhere;

`2ocen:` $m = 100$, $n = 99$, cypress can be planted only on the inner vertical tile sides;

`3ocen:` $m = 1000$, $n = 999$, cypress cannot be planted anywhere.

Grading

The set of tests consists of the following subsets. Within each subset, there may be several test groups.

If your program produces a correct first line, but the rest of its output is incorrect, it will be granted 52% of the test's score. In particular, to receive the 52% of the score for any test, it suffices to output only one line.

Subset	Property	Score
1	$n \cdot m \leq 12$	25
2	$n, m \leq 100$	25
3	$n, m \leq 1000$	50