

D. Ingenuity-2

time limit per test: 2 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

Let's imagine the surface of Mars as an infinite coordinate plane. Initially, the rover Perseverance-2 and the helicopter Ingenuity-2 are located at the point with coordinates $(0, 0)$. A set of instructions s consisting of n instructions of the following types was specially developed for them:

- N: move one meter north (from point (x, y) to $(x, y + 1)$);
- S: move one meter south (from point (x, y) to $(x, y - 1)$);
- E: move one meter east (from point (x, y) to $(x + 1, y)$);
- W: move one meter west (from point (x, y) to $(x - 1, y)$).

Each instruction must be executed either by the rover or by the helicopter. Moreover, each device must execute **at least one** instruction. Your task is to distribute the instructions in such a way that after executing all n instructions, the helicopter and the rover end up at the same point, or determine that this is impossible.

Input

The first line of input contains t ($1 \leq t \leq 10^4$) — the number of test cases.

The first line of each test case contains a single integer n ($1 \leq n \leq 2 \cdot 10^5$) — the number of instructions.

The second line of each test case contains a string s of length n consisting of the characters 'N', 'S', 'E', 'W' — the sequence of instructions.

It is guaranteed that the sum of n over all test cases does not exceed $2 \cdot 10^5$.

Output

For each test case, if the required distribution of instructions exists, output a string p of length n consisting of the characters 'R', 'H'. If the i -th operation should be executed by the rover, then $p_i = \text{R}$, if the i -th operation should be executed by the helicopter, then $p_i = \text{H}$. If there are multiple solutions, output any of them.

Otherwise, output NO.

Example

input

Copy

```
10
6
NENSNE
3
WWW
6
NESSWS
2
SN
2
WE
4
SSNN
4
```

Codeforces Round 946 (Div. 3)

System testing

50%

Practice



→ Problem tags

constructive algorithms

implementation

No tag edit access

→ Contest materials

- [Announcement \(en\)](#)

WESN
2
SS
4
EWNN
4
WEWE

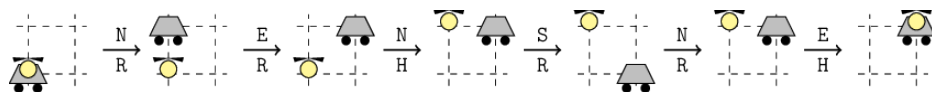
output

Copy

RRHRRH
NO
HRRHRH
NO
NO
RHRH
RRHH
RH
RRRH
RRHH

Note

Let's consider the first example: the string $S = \text{NENSNE}$. One of the possible solutions, shown in the figure below, is $p = \text{RRHRRH}$, using which both the rover and the helicopter will end up one meter north and one meter east.



For WWW , the solution is impossible.

[Codeforces](#) (c) Copyright 2010-2024 Mike Mirzayanov

The only programming contests Web 2.0 platform

Server time: May/21/2024 11:04:46^{UTC+6} (j2).

Desktop version, switch to [mobile version](#).

[Privacy Policy](#)

Supported by



ITMO UNIVERSITY