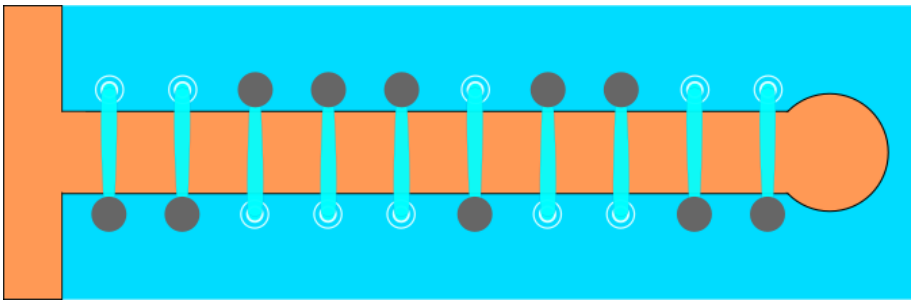
XXV Spain Olympiad in Informatics
Final, day 1
`estatuas`

Merlion statues

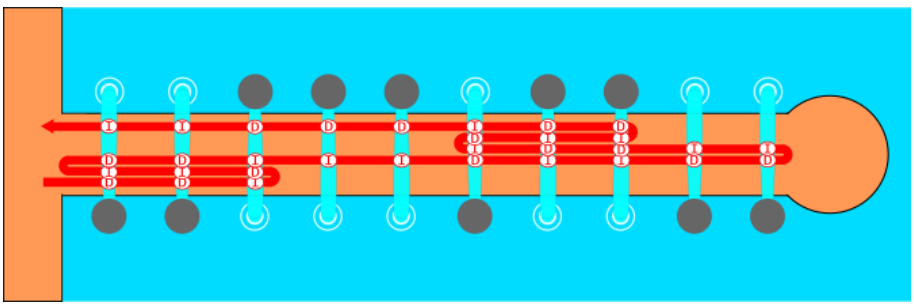
The merlion is tha national mythological animal of Singapore. In the city there are some statues of a Merlion releasing water through its mouth.

Steven is walking around Singapur and has found a runway where there are merlion statues at the sides, forming water arcs above it.



An example of possible runway. There can not be two statues at both sides in the same point.

Steven has decided to walk through the runway, and while he is walking through it each time he passes along a statue he writes down in his notebook at which side he sees the merlion statue: at his right or at his left. Steven starts walking forward, but he can choose to turn around at any point in the walk, and he can turn around multiple times. His walk has to finish at the same place it started: the entrance of the runway.



Here is a possible walk. D means right, I means left. Note that when turning around Steven sees the statues at the opposite side. In this case, Steven writes into his notebook `DDIDIIDDIIIDIIDDIIDDIDIIDDIDDDII`.

Now Steven wants to remember how the runway was and how was the walk he did, but he only has the annotations. From these annotations, you must reconstruct a possible distribution of statues and a possible walk that generates the annotations. It is possible that the annotations given in the input are wrong and it is impossible to construct a walk generating them, if so you must indicate it.

Input and output

The first line of the input contains one integer T, the number of cases.

For each case, there is one line with an integer n, the number of annotations, followrd by a line with a string of n characters `D` or `I`, representing the annotations (`D` means right and `I` means left).

For each case, you must print a line with the word `NO` if the annotations are not consistent with any possible walk and statue distribution. Otherwise, you must write a line with the word `SI`, followed by a description of a possible runway and walk, which consists in 4 lines. The first is a number m, the number of statues, the second is a string of m characters `D` or `I` which describes the position of the statues when Steven walks forward in the runway, the third is a number c, the number of direction changes during the walk, and the fourth consists in c numbers $x_1, \ldots, x_c$ with $0 \leq x_i \leq m$ which indicate the positions in which Steven turns around where position 0 is the entrance to the runway and position j with $j > 0$ is the position just after the j-th statue. x_i must satisfy $0 < x_1$, $x_{2i-1} > x_{2i} < x_{2i+1}$.

Numbers m and c must be less than or equal to n.

Sample

Input:

```
5
32
DDIDIIDDIIIDIIDDIIDDIDIIDDIDDDII
2
DD
2
ID
4
IDDI
12
DIIDDIIDIDDI
```

Output:

```
SI
10
DDIIIDIIDD
5
3 0 10 5 8
NO
SI
1
I
1
1
NO
SI
4
DIID
3
3 1 4
```

The first case is the example in the statement.

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Constraints

$1 \leq T \leq 10^6$.

$1 \leq n \leq 10^6$, sum of n for all cases is at most 10^6.

Subtasks

1. (16 points) $n \leq 15$, sum of n for all cases is at most 500.
2. (41 points) $n \leq 1000$, sum of n for all cases is at most 20000.
3. (8 points) There are not more than 2 consecutive equal characters in the annotations.
4. (18 points) It is guaranteed that, if there is a solution, then there is one with 10 estatuas or less.
5. (17 points) No additional restrictions.