[P] Resistors for Mike

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   Time limit:   1 second
Memory limit:   65535 kBytes
```

Description

Given n classes of resistors, an old electronics engineer named Mike was asked to calculate the equivalent resistance of a given circuit. The circuit is formed by connecting some of the given resistors in series or in parallel.

Mike is busy and he also lost his glasses, so he asked you to help him with this task.

Input

The input file consists of:

- A line containing n – the number of resistor classes.
- A line containing the resistor values $r_0, \ldots, r_{n-1}$ in Ohms (each between 1.0 and 10000.0 Ohms, inclusive).
- A line with a string expression describing how resistors are connected (series, parallel, or a single resistor).

More formally, an expression may be:

- A single resistor r_j.
- An $S(\ldots)$ expression, representing serial connection between the expressions listed as arguments.
- A $P(\ldots)$ expression, representing parallel connection between the expressions listed as arguments.

Note that nested expressions are allowed. The rules for calculating the resistance of serial and parallel connections can be found in the Remarks section below.

Some examples of valid expressions:

- `S(r0,r1,r2)`
- `P(r3,r4)`
- `S(P(r0,r1),r2)`

Output

On the first line, output the equivalent resistance rounded to 6 digits after the decimal point.

On the second line, print a single integer describing the resistor usage in the circuit:

- **0** – at least one resistor unused, and no resistor used more than once
- **1** – all n resistors used exactly once
- **2** – all resistors used, but some used more than once
- **3** – not all resistors used, and some used more than once

Constraints

- $1 \leq n \leq 30$
- $1.0 <= r_i <= 10000.0$ for each $i = 0, \ldots, n-1$.
- The length of the string expression is at most 150 characters.

Remarks

- A series combination of k components is represented as $S(r_0, r_1, ..., r_{k-1})$ and its equivalent resistance is $\sum_{i=0}^{k-1} r_i$.
- A parallel combination of k components is represented as $P(r_0, r_1, ..., r_{k-1})$ and its equivalent resistance is given by $\frac{1}{\sum_{i=0}^{k-1}\left(\frac{1}{r_i}\right)}$.
- If $n = 2$, $r_0 = r_1 = 1$ Ohm, and the expression is `S(r0,r1)`, then both resistors are considered used exactly once even though their values match. So the second output line should be 1 in this case.

Examples

Input	Output
5 4.0 7.2 3. 1.0 2025.11 S(r0,r1,r2,r3,r4)	2040.310000 1
4 4 4 6 6 S(P(r0,r1),P(r2,r3))	5.000000 1
4 4 6 6 4 S(P(r0,r1),P(r2,r3))	4.800000 1
4 4 4 6 6 P(S(r0,r2),S(r1,r3))	5.000000 1
3 1 2 3.5 S(P(P(r1,r1),r0),r2)	4.000000 2
5 4 4 6 6 9 P(S(r0,r2),S(r1,r3))	5.000000 0
2 3 2 S(P(r1,r1),r0)	4.000000 2
4 1 2 3 4 S(P(r1,r1),r2)	4.000000 3
3 1 2 3 r0	1.000000 0
10 1 2 3 4 5 6 7 8 9 10 S(r0,r1,r2,r3,P(r4,r5,r6),P(r7,S(r8,r9)))	17.592246 1