# (Adv.) Competitive Programming

**Submit until 10.05.2019 13:30, via the judge interface**


**Problem: alchemy2** (1 second timelimit)

You are an alchemist and have recently discovered a somewhat peculiar set of $n$ elements. Any element can be converted into any other using the $n-1$ conversions you discovered. Each of the elements also has a corresponding anti element, which it can be converted to. Between the anti elements you also found $n-1$ conversions, which mirror those between the normal ones.

While each of the conversions works both ways, they, in most cases, are not lossless. For each one you figured out a ratio $r$[1], which is the same for both directions.

You are interested in the most efficient ways to convert elements into their anti forms. The direct way is often very lossy, so you are experimenting with using other elements as intermediate forms.

**Input** The first line contains $n$ ($1 \leq n \leq 10^5$), the number of elements. The next line contains the numbers $r_1$ to $r_n$ ($0 < r_i \leq 1$), the ratios for the conversion between the elements and their anti form. Finally, the last $n-1$ lines each contain a conversion in the form of $a$, $b$, $r$, and $r'$ ($1 \leq a, b \leq n$, $0 < r, r' \leq 1$, $a \neq b$), where $a$ and $b$ are the convertible elements, $r$ is the ratio for the normal conversion, and $r'$ the one for the anti element conversion.

**Output** Print $n$ lines, where the $i$-th line contains the highest possible ratio for converting element $i$ into its anti form. Only the first 7 digits after the decimal point need to be correct. Make sure that you calculate and print with enough precision (see, for example, `cout.precision`).

**Sample input**

```
3
0.01 0.5 0.1
1 2 1.0 0.1
2 3 0.5 0.5
```

**Sample output**

```
0.05
0.5
0.125
```

[1] Meaning that 1 unit of the input element nets you $r$ units of the output element

```
5
0.01 0.01 0.05 0.8 0.9
1 3 0.1 1.0
2 3 0.5 1.0
3 4 0.2 0.5
4 5 1.0 1.0
```

```
0.01
0.045
0.09
0.9
0.9
```

**Sample explanation** In the first sample, you can convert element two directly to its anti form at a ratio of $0.5$. Element one can be converted losslessly to element two, which can then be converted to its anti form (ratio $0.5$) and finally to element ones anti form (ratio $0.1$), for a total ratio of $0.05$. Element three can be converted similarly using element two as an intermediary form, for a total ratio of $0.5 \cdot 0.5 \cdot 0.5 = 0.125$.