A. Comparing Strings

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Some dwarves that are finishing the StUDY (State University for Dwarven Youngsters) Bachelor courses, have been told "no genome, no degree". That means that all dwarves should write a thesis on genome. Dwarven genome is far from simple. It is represented by a string that consists of lowercase Latin letters.

Dwarf Misha has already chosen the subject for his thesis: determining by two dwarven genomes, whether they belong to the same race. Two dwarves belong to the same race if we can swap two characters in the first dwarf's genome and get the second dwarf's genome as a result. Help Dwarf Misha and find out whether two gnomes belong to the same race or not.

Input

The first line contains the first dwarf's genome: a non-empty string, consisting of lowercase Latin letters.

The second line contains the second dwarf's genome: a non-empty string, consisting of lowercase Latin letters.

The number of letters in each genome doesn't exceed 10^5. It is guaranteed that the strings that correspond to the genomes are different. The given genomes may have different length.

Output

Print "YES", if the dwarves belong to the same race. Otherwise, print "NO".

Examples

input

```
ab
ba
```

output

```
YES
```

input

```
aa
ab
```

output

```
NO
```

Note

- First example: you can simply swap two letters in string "ab". So we get "ba".
- Second example: we can't change string "aa" into string "ab", because "aa" does not contain letter "b".

B. Growing Mushrooms

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Each year in the castle of Dwarven King there is a competition in growing mushrooms among the dwarves. The competition is one of the most prestigious ones, and the winner gets a wooden salad bowl. This year's event brought together the best mushroom growers from around the world, so we had to slightly change the rules so that the event gets more interesting to watch.

Each mushroom grower has a mushroom that he will grow on the competition. Under the new rules, the competition consists of two parts. The first part lasts t_1 seconds and the second part lasts t_2 seconds. The first and the second part are separated by a little break.

After the starting whistle the first part of the contest starts, and all mushroom growers start growing mushrooms at once, each at his individual speed of v_i meters per second. After t_1 seconds, the mushroom growers stop growing mushrooms and go to have a break. During the break, for unexplained reasons, the growth of all mushrooms is reduced by k percent. After the break the second part of the contest starts and all mushrooms growers at the same time continue to grow mushrooms, each at his individual speed of u_i meters per second. After a t_2 seconds after the end of the break, the competition ends. Note that the speeds before and after the break may vary.

Before the match dwarf Pasha learned from all participants, what two speeds they have chosen. However, the participants did not want to disclose to him all their strategy and therefore, did not say in what order they will be using these speeds. That is, if a participant chose speeds a_i and b_i, then there are two strategies: he either uses speed a_i before the break and speed b_i after it, or vice versa.

Dwarf Pasha really wants to win the totalizer. He knows that each participant chooses the strategy that maximizes the height of the mushroom. Help Dwarf Pasha make the final table of competition results.

The participants are sorted in the result table by the mushroom height (the participants with higher mushrooms follow earlier in the table). In case of equal mushroom heights, the participants are sorted by their numbers (the participants with a smaller number follow earlier).

Input

The first input line contains four integer numbers n, t_1, t_2, k $(1 \le n, t_1, t_2 \le 1000;\ 1 \le k \le 100)$ — the number of participants, the time before the break, the time after the break and the percentage, by which the mushroom growth drops during the break, correspondingly.

Each of the following n lines contains two integers. The i-th $(1 \le i \le n)$ line contains space-separated integers a_i, b_i $(1 \le a_i, b_i \le 1000)$ — the speeds which the participant number i chose.

Output

Print the final results' table: n lines, each line should contain the number of the corresponding dwarf and the final maximum height of his mushroom with **exactly two digits** after the decimal point. The answer will be considered correct if it is **absolutely accurate**.

Examples

input

```
2 3 3 50
2 4
4 2
```

output

```
1 15.00
2 15.00
```

input

```
4 1 1 1
544 397
280 101
280 101
693 970
```

output

```
4 1656.07
1 937.03
2 379.99
3 379.99
```

Note

- First example: for each contestant it is optimal to use firstly speed 2 and afterwards speed 4, because

$2 \cdot 3 \cdot 0.5 + 4 \cdot 3 > 4 \cdot 3 \cdot 0.5 + 2 \cdot 3.$

C. Plant

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Dwarfs have planted a very interesting plant, which is a triangle directed "upwards". This plant has an amusing feature. After one year a triangle plant directed "upwards" divides into four triangle plants: three of them will point "upwards" and one will point "downwards". After another year, each triangle plant divides into four triangle plants: three of them will be directed in the same direction as the parent plant, and one of them will be directed in the opposite direction. Then each year the process repeats. The figure below illustrates this process.

Help the dwarfs find out how many triangle plants that point "upwards" will be in n years.

Input

The first line contains a single integer n $(0 \le n \le 10^{18})$ — the number of full years when the plant grew.

Please do not use the %lld specifier to read or write 64-bit integers in C++. It is preferred to use cin, cout streams or the %I64d specifier.

Output

Print a single integer — the remainder of dividing the number of plants that will point "upwards" in n years by 1000000007 $(10^9 + 7)$.

Examples

input
```
1
```
output
```
3
```

input
```
2
```
output
```
10
```

Note

The first test sample corresponds to the second triangle on the figure in the statement. The second test sample corresponds to the third one.

D. Mushroom Scientists

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

As you very well know, the whole Universe traditionally uses three-dimensional Cartesian system of coordinates. In this system each point corresponds to three real coordinates (x, y, z). In this coordinate system, the distance between the center of the Universe and the point is calculated by the following formula: $\sqrt{x^2+y^2+z^2}$. Mushroom scientists that work for the Great Mushroom King think that the Universe isn't exactly right and the distance from the center of the Universe to a point equals $x^a \cdot y^b \cdot z^c$.

To test the metric of mushroom scientists, the usual scientists offered them a task: find such x, y, z $(0 \le x, y, z;\ x + y + z \le S)$, that the distance between the center of the Universe and the point (x, y, z) is maximum possible in the metric of mushroom scientists. The mushroom scientists aren't good at maths, so they commissioned you to do the task.

Note that in this problem, it is considered that $0^0 = 1$.

Input

The first line contains a single integer S $(1 \le S \le 10^3)$ — the maximum sum of coordinates of the sought point.

The second line contains three space-separated integers a, b, c $(0 \le a, b, c \le 10^3)$ — the numbers that describe the metric of mushroom scientists.

Output

Print three real numbers — the coordinates of the point that reaches maximum value in the metrics of mushroom scientists. If there are multiple answers, print any of them that meets the limitations.

A natural logarithm of distance from the center of the Universe to the given point in the metric of mushroom scientists shouldn't differ from the natural logarithm of the maximum distance by more than 10^{-6}. We think that $ln(0) = -\infty$.

Examples

input

```
3
1 1 1
```

output

```
1.0 1.0 1.0
```

input

```
3
2 0 0
```

output

```
3.0 0.0 0.0
```

E. Clever Fat Rat

time limit per test: 2.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The Fat Rat and his friend Cerealguy have had a bet whether at least a few oats are going to descend to them by some clever construction. The figure below shows the clever construction.

A more formal description of the clever construction is as follows. The clever construction consists of n rows with scales. The first row has n scales, the second row has $(n - 1)$ scales, the i-th row has $(n - i + 1)$ scales, the last row has exactly one scale. Let's number the scales in each row from the left to the right, starting from 1. Then the value of $w_{i, k}$ in kilograms $(1 \le i \le n; 1 \le k \le n - i + 1)$ is the weight capacity parameter of the k-th scale in the i-th row.

If a body whose mass is not less than $w_{i, k}$ falls on the scale with weight capacity $w_{i, k}$, then the scale breaks. At that anything that the scale has on it, either falls one level down to the left (if possible) or one level down to the right (if possible). In other words, if the scale $w_{i, k}$ $(i < n)$ breaks, then there are at most two possible variants in which the contents of the scale's pan can fall out: **all contents** of scale $w_{i, k}$ falls either on scale $w_{i+1, k-1}$ (if it exists), or on scale $w_{i+1, k}$ (if it exists). If scale $w_{n, 1}$ breaks, then all its contents falls right in the Fat Rat's claws. Please note that the scales that are the first and the last in a row, have only one variant of dropping the contents.

Initially, oats are simultaneously put on all scales of the first level. The i-th scale has a_i kilograms of oats put on it. After that the scales start breaking and the oats start falling down in some way. You can consider everything to happen instantly. That is, the scale breaks instantly and the oats also fall instantly.

The Fat Rat is sure that whatever happens, he will not get the oats from the first level. Cerealguy is sure that there is such a scenario, when the rat gets at least some number of the oats. Help the Fat Rat and the Cerealguy. Determine, which one is right.

Input

The first line contains a single integer n $(1 \le n \le 50)$ — the number of rows with scales.

The next line contains n space-separated integers a_i $(1 \le a_i \le 10^6)$ — the masses of the oats in kilograms.

The next n lines contain descriptions of the scales: the i-th line contains $(n - i + 1)$ space-separated integers $w_{i, k}$ $(1 \le w_{i, k} \le 10^6)$ — the weight capacity parameters for the scales that stand on the i-th row, in kilograms.

Output

Print "`Fat Rat`" if the Fat Rat is right, otherwise print "`Cerealguy`".

Examples

input

```
1
1
2
```

output

```
Fat Rat
```

input

```
2
2 2
1 2
4
```

output

```
Cerealguy
```

input

```
2
2 2
1 2
5
```

output

```
Fat Rat
```

Note

Notes to the examples:

- The first example: the scale with weight capacity 2 gets 1. That means that the lower scale don't break.
- The second sample: all scales in the top row obviously break. Then the oats fall on the lower row. Their total mass is 4,and that's

exactly the weight that the lower scale can "nearly endure". So, as $4 \geq 4$, the scale breaks.
