A - Red or Not

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 100 points

Problem Statement

You will be given an integer a and a string s consisting of lowercase English letters as input.

Write a program that prints s if a is not less than 3200 and prints `red` if a is less than 3200.

Constraints

- $2800 \leq a < 5000$
- s is a string of length between 1 and 10 (inclusive).
- Each character of s is a lowercase English letter.

Input

Input is given from Standard Input in the following format:

$$
\begin{array}{l} a \\ s \end{array}
$$

Output

If a is not less than 3200, print s; if a is less than 3200, print `red`.

Sample Input 1

```
3200
pink
```

Sample Output 1

```
pink
```

$a = 3200$ is not less than 3200, so we print $s =$ `pink`.

Sample Input 2

```
3199
pink
```

Sample Output 2

```
red
```

$a = 3199$ is less than 3200, so we print `red`.

Sample Input 3

```
4049
red
```

Sample Output 3

```
red
```

$a = 4049$ is not less than 3200, so we print $s =$ `red`.

B - Resistors in Parallel

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 200 points

Problem Statement

Given is a sequence of N integers $A_1, \ldots, A_N$.

Find the (multiplicative) inverse of the sum of the inverses of these numbers, $\frac{1}{\frac{1}{A_1} + \ldots + \frac{1}{A_N}}$.

Constraints

- $1 \leq N \leq 100$
- $1 \leq A_i \leq 1000$

Input

Input is given from Standard Input in the following format:

N
$A_1 \quad A_2 \quad \ldots \quad A_N$

Output

Print a decimal number (or an integer) representing the value of $\frac{1}{\frac{1}{A_1} + \ldots + \frac{1}{A_N}}$.

Your output will be judged correct when its absolute or relative error from the judge's output is at most 10^{-5}.

Sample Input 1

```
2
10 30
```

Sample Output 1

```
7.5
```

$\frac{1}{\frac{1}{10}+\frac{1}{30}} = \frac{1}{\frac{4}{30}} = \frac{30}{4} = 7.5.$

Printing '`7.50001`', '`7.49999`', and so on will also be accepted.

Sample Input 2

```
3
200 200 200
```

Sample Output 2

```
66.66666666666667
```

$\frac{1}{\frac{1}{200}+\frac{1}{200}+\frac{1}{200}} = \frac{1}{\frac{3}{200}} = \frac{200}{3} = 66.6666....$

Printing '`6.66666e+1`' and so on will also be accepted.

Sample Input 3

```
1
1000
```

Sample Output 3

```
1000
```

$\frac{1}{\frac{1}{1000}} = 1000.$

Printing '`+1000.0`' and so on will also be accepted.

C - Alchemist

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 300 points

Problem Statement

You have a pot and N ingredients. Each ingredient has a real number parameter called *value*, and the value of the i-th ingredient $(1 \leq i \leq N)$ is v_i.

When you put two ingredients in the pot, they will vanish and result in the formation of a new ingredient. The value of the new ingredient will be $(x + y)/2$ where x and y are the values of the ingredients consumed, and you can put this ingredient again in the pot.

After you compose ingredients in this way $N - 1$ times, you will end up with one ingredient. Find the maximum possible value of this ingredient.

Constraints

- $2 \leq N \leq 50$
- $1 \leq v_i \leq 1000$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$N$$
$$v_1 \quad v_2 \quad \ldots \quad v_N$$

Output

Print a decimal number (or an integer) representing the maximum possible value of the last ingredient remaining.

Your output will be judged correct when its absolute or relative error from the judge's output is at most 10^{-5}.

Sample Input 1

```
2
3 4
```

Sample Output 1

```
3.5
```

If you start with two ingredients, the only choice is to put both of them in the pot. The value of the ingredient resulting from the ingredients of values 3 and 4 is $(3+4)/2=3.5$.

Printing `'3.50001'`, `'3.49999'`, and so on will also be accepted.

Sample Input 2

```
3
500 300 200
```

Sample Output 2

```
375
```

You start with three ingredients this time, and you can choose what to use in the first composition. There are three possible choices:

- Use the ingredients of values 500 and 300 to produce an ingredient of value $(500+300)/2=400$. The next composition will use this ingredient and the ingredient of value 200, resulting in an ingredient of value $(400+200)/2=300$.
- Use the ingredients of values 500 and 200 to produce an ingredient of value $(500+200)/2=350$. The next composition will use this ingredient and the ingredient of value 300, resulting in an ingredient of value $(350+300)/2=325$.
- Use the ingredients of values 300 and 200 to produce an ingredient of value $(300+200)/2=250$. The next composition will use this ingredient and the ingredient of value 500, resulting in an ingredient of value $(250+500)/2=375$.

Thus, the maximum possible value of the last ingredient remaining is 375.

Printing `'375.0'` and so on will also be accepted.

Sample Input 3

```
5
138 138 138 138 138
```

Sample Output 3

```
138
```

D - Ki

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 400 points

Problem Statement

Given is a rooted tree with N vertices numbered 1 to N. The root is Vertex 1, and the i-th edge $(1 \leq i \leq N-1)$ connects Vertex a_i and b_i.

Each of the vertices has a counter installed. Initially, the counters on all the vertices have the value 0.

Now, the following Q operations will be performed:

- Operation j $(1 \leq j \leq Q)$: Increment by x_j the counter on every vertex contained in the subtree rooted at Vertex p_j.

Find the value of the counter on each vertex after all operations.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $1 \leq Q \leq 2 \times 10^5$
- $1 \leq a_i < b_i \leq N$
- $1 \leq p_j \leq N$
- $1 \leq x_j \leq 10^4$
- The given graph is a tree.
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$
\begin{array}{l}
N \quad Q \\
a_1 \quad b_1 \\
: \\
a_{N-1} \quad b_{N-1} \\
p_1 \quad x_1 \\
: \\
p_Q \quad x_Q
\end{array}
$$

Output

Print the values of the counters on Vertex $1, 2, \ldots, N$ after all operations, in this order, with spaces in between.

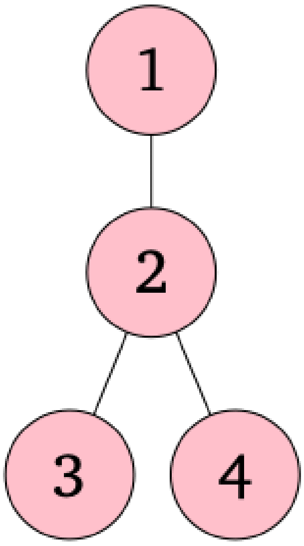
Sample Input 1

```
4 3
1 2
2 3
2 4
2 10
1 100
3 1
```

Sample Output 1

```
100 110 111 110
```

The tree in this input is as follows:



Each operation changes the values of the counters on the vertices as follows:

- Operation 1: Increment by 10 the counter on every vertex contained in the subtree rooted at Vertex 2, that is, Vertex $2, 3, 4$. The values of the counters on Vertex $1, 2, 3, 4$ are now $0, 10, 10, 10$, respectively.
- Operation 2: Increment by 100 the counter on every vertex contained in the subtree rooted at Vertex 1, that is, Vertex $1, 2, 3, 4$. The values of the counters on Vertex $1, 2, 3, 4$ are now $100, 110, 110, 110$, respectively.
- Operation 3: Increment by 1 the counter on every vertex contained in the subtree rooted at Vertex 3, that is, Vertex 3. The values of the counters on Vertex $1, 2, 3, 4$ are now $100, 110, 111, 110$, respectively.

Sample Input 2

```
6 2
1 2
1 3
2 4
3 6
2 5
1 10
1 10
```

Sample Output 2

```
20 20 20 20 20 20
```

E - Strings of Impurity

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 500 points

Problem Statement

Given are two strings s and t consisting of lowercase English letters. Determine if there exists an integer i satisfying the following condition, and find the minimum such i if it exists.

- Let s' be the concatenation of 10^{100} copies of s. t is a subsequence of the string ${s'}_1{s'}_2\ldots{s'}_i$ (the first i characters in s').

Notes

- A subsequence of a string a is a string obtained by deleting zero or more characters from a and concatenating the remaining characters without changing the relative order. For example, the subsequences of `contest` include `net`, `c`, and `contest`.

Constraints

- $1 \leq |s| \leq 10^5$
- $1 \leq |t| \leq 10^5$
- s and t consists of lowercase English letters.

Input

Input is given from Standard Input in the following format:

```
s
t
```

Output

If there exists an integer i satisfying the following condition, print the minimum such i; otherwise, print `-1`.

Sample Input 1

```
contest
son
```

Sample Output 1

```
10
```

$t =$ 'son' is a subsequence of the string 'contestcon' (the first 10 characters in $s' =$ 'contestcontestcontest...'), so $i = 10$ satisfies the condition.

On the other hand, t is not a subsequence of the string 'contestco' (the first 9 characters in s'), so $i = 9$ does not satisfy the condition.

Similarly, any integer less than 9 does not satisfy the condition, either. Thus, the minimum integer i satisfying the condition is 10.

Sample Input 2

```
contest
programming
```

Sample Output 2

```
-1
```

$t =$ 'programming' is not a substring of $s' =$ 'contestcontestcontest...'. Thus, there is no integer i satisfying the condition.

Sample Input 3

```
contest
sentence
```

Sample Output 3

```
33
```

Note that the answer may not fit into a 32-bit integer type, though we cannot put such a case here.

F - Coincidence

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

Given are integers L and R. Find the number, modulo $10^9 + 7$, of pairs of integers (x, y) $(L \leq x \leq y \leq R)$ such that the remainder when y is divided by x is equal to $y \text{ XOR } x$.

▶ What is XOR ?

Constraints

- $1 \leq L \leq R \leq 10^{18}$

Input

Input is given from Standard Input in the following format:

$$L \quad R$$

Output

Print the number of pairs of integers (x, y) $(L \leq x \leq y \leq R)$ satisfying the condition, modulo $10^9 + 7$.

Sample Input 1

```
2 3
```

Sample Output 1

```
3
```

Three pairs satisfy the condition: $(2, 2)$, $(2, 3)$, and $(3, 3)$.

Sample Input 2

```
10 100
```

Sample Output 2

```
604
```

Sample Input 3

```
1 1000000000000000000
```

Sample Output 3

```
68038601
```

Be sure to compute the number modulo $10^9 + 7$.