Educational Codeforces Round 13

A. Johny Likes Numbers

time limit per test: 0.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Johny likes numbers n and k very much. Now Johny wants to find the smallest integer x greater than n, so it is divisible by the number k.

Input

The only line contains two integers n and k ($1 \le n, k \le 10^9$).

Output

Print the smallest integer $x > n$, so it is divisible by the number k.

Examples

input
5 3
output
6

input
25 13
output
26

input
26 13
output
39

B. The Same Calendar

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

The girl Taylor has a beautiful calendar for the year y. In the calendar all days are given with their days of week: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday.

The calendar is so beautiful that she wants to know what is the next year after y when the calendar will be exactly the same. Help Taylor to find that year.

Note that leap years has 366 days. The year is leap if it is divisible by 400 or it is divisible by 4, but not by 100 (https://en.wikipedia.org/wiki/Leap_year).

Input

The only line contains integer y ($1000 \le y < 100'000$) — the year of the calendar.

Output

Print the only integer y' — the next year after y when the calendar will be the same. Note that you should find the first year after y with the same calendar.

Examples

input
2016
output
2044

input
2000
output
2028

input
50501
output
50507

Note

Today is Monday, the 13th of June, 2016.

C. Joty and Chocolate

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Little Joty has got a task to do. She has a line of n tiles indexed from 1 to n. She has to paint them in a strange pattern.

An unpainted tile should be painted Red if it's index is divisible by a and an unpainted tile should be painted Blue if it's index is divisible by b. So the tile with the number divisible by a and b can be either painted Red or Blue.

After her painting is done, she will get p chocolates for each tile that is painted Red and q chocolates for each tile that is painted Blue.

Note that she can paint tiles in any order she wants.

Given the required information, find the maximum number of chocolates Joty can get.

Input

The only line contains five integers n, a, b, p and q ($1 \leq n, a, b, p, q \leq 10^9$).

Output

Print the only integer s — the maximum number of chocolates Joty can get.

Note that the answer can be too large, so you should use 64-bit integer type to store it. In `C++` you can use the `long long` integer type and in `Java` you can use `long` integer type.

Examples

input
5 2 3 12 15
output
39

input
20 2 3 3 5
output
51

D. Iterated Linear Function

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Consider a linear function $f(x) = Ax + B$. Let's define $g^{(0)}(x) = x$ and $g^{(n)}(x) = f(g^{(n-1)}(x))$ for $n > 0$. For the given integer values A, B, n and x find the value of $g^{(n)}(x)$ modulo $10^9 + 7$.

Input

The only line contains four integers A, B, n and x ($1 \le A, B, x \le 10^9$, $1 \le n \le 10^{18}$) — the parameters from the problem statement.

Note that the given value n can be too large, so you should use 64-bit integer type to store it. In `C++` you can use the `long long` integer type and in `Java` you can use `long` integer type.

Output

Print the only integer s — the value $g^{(n)}(x)$ modulo $10^9 + 7$.

Examples

input
3 4 1 1
output
7

input
3 4 2 1
output
25

input
3 4 3 1
output
79

E. Another Sith Tournament

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

The rules of Sith Tournament are well known to everyone. n Sith take part in the Tournament. The Tournament starts with the random choice of two Sith who will fight in the first battle. As one of them loses, his place is taken by the next randomly chosen Sith who didn't fight before. Does it need to be said that each battle in the Sith Tournament ends with a death of one of opponents? The Tournament ends when the only Sith remains alive.

Jedi Ivan accidentally appeared in the list of the participants in the Sith Tournament. However, his skills in the Light Side of the Force are so strong so he can influence the choice of participants either who start the Tournament or who take the loser's place after each battle. Of course, he won't miss his chance to take advantage of it. Help him to calculate the probability of his victory.

Input

The first line contains a single integer n ($1 \le n \le 18$) — the number of participants of the Sith Tournament.

Each of the next n lines contains n real numbers, which form a matrix p_{ij} ($0 \le p_{ij} \le 1$). Each its element p_{ij} is the probability that the i-th participant defeats the j-th in a duel.

The elements on the main diagonal p_{ii} are equal to zero. For all different i, j the equality $p_{ij} + p_{ji} = 1$ holds. All probabilities are given with no more than six decimal places.

Jedi Ivan is the number 1 in the list of the participants.

Output

Output a real number — the probability that Jedi Ivan will stay alive after the Tournament. Absolute or relative error of the answer must not exceed 10^{-6}.

Examples

input
3 0.0 0.5 0.8 0.5 0.0 0.4 0.2 0.6 0.0
output
0.680000000000000

F. Lena and Queries

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Lena is a programmer. She got a task to solve at work.

There is an empty set of pairs of integers and n queries to process. Each query is one of three types:

1. Add a pair (a, b) to the set.
2. Remove a pair added in the query number i. All queries are numbered with integers from 1 to n.
3. For a given integer q find the maximal value $x \cdot q + y$ over all pairs (x, y) from the set.

Help Lena to process the queries.

Input

The first line of input contains integer n ($1 \le n \le 3 \cdot 10^5$) — the number of queries.

Each of the next n lines starts with integer t ($1 \le t \le 3$) — the type of the query.

A pair of integers a and b ($-10^9 \le a, b \le 10^9$) follows in the query of the first type.

An integer i ($1 \le i \le n$) follows in the query of the second type. It is guaranteed that i is less than the number of the query, the query number i has the first type and the pair from the i-th query is not already removed.

An integer q ($-10^9 \le q \le 10^9$) follows in the query of the third type.

Output

For the queries of the third type print on a separate line the desired maximal value of $x \cdot q + y$.

If there are no pairs in the set print "`EMPTY SET`".

Example

input
7 3 1 1 2 3 3 1 1 -1 100 3 1 2 4 3 1

output
EMPTY SET 5 99 5