Codeforces Round #247 (Div. 2)

A. Black Square

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

Quite recently, a very smart student named Jury decided that lectures are boring, so he downloaded a game called "`Black Square`" on his super cool touchscreen phone.

In this game, the phone's screen is divided into four vertical strips. Each second, a black square appears on some of the strips. According to the rules of the game, Jury must use this second to touch the corresponding strip to make the square go away. As Jury is both smart and lazy, he counted that he wastes exactly a_i calories on touching the i-th strip.

You've got a string s, describing the process of the game and numbers a_1, a_2, a_3, a_4. Calculate how many calories Jury needs to destroy all the squares?

Input

The first line contains four space-separated integers a_1, a_2, a_3, a_4 ($0 \le a_1, a_2, a_3, a_4 \le 10^4$).

The second line contains string s ($1 \le |s| \le 10^5$), where the i-th character of the string equals "1", if on the i-th second of the game the square appears on the first strip, "2", if it appears on the second strip, "3", if it appears on the third strip, "4", if it appears on the fourth strip.

Output

Print a single integer — the total number of calories that Jury wastes.

Examples

input

```
1 2 3 4
123214
```

output

```
13
```

input

```
1 5 3 2
11221
```

output

```
13
```

B. Shower Line

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

Many students live in a dormitory. A dormitory is a whole new world of funny amusements and possibilities but it does have its drawbacks.

There is only one shower and there are multiple students who wish to have a shower in the morning. That's why every morning there is a line of five people in front of the dormitory shower door. As soon as the shower opens, the first person from the line enters the shower. After a while the first person leaves the shower and the next person enters the shower. The process continues until everybody in the line has a shower.

Having a shower takes some time, so the students in the line talk as they wait. At each moment of time the students talk in pairs: the $(2i - 1)$-th man in the line (for the current moment) talks with the $(2i)$-th one.

Let's look at this process in more detail. Let's number the people from 1 to 5. Let's assume that the line initially looks as 23154 (person number 2 stands at the beginning of the line). Then, before the shower opens, 2 talks with 3, 1 talks with 5, 4 doesn't talk with anyone. Then 2 enters the shower. While 2 has a shower, 3 and 1 talk, 5 and 4 talk too. Then, 3 enters the shower. While 3 has a shower, 1 and 5 talk, 4 doesn't talk to anyone. Then 1 enters the shower and while he is there, 5 and 4 talk. Then 5 enters the shower, and then 4 enters the shower.

We know that if students i and j talk, then the i-th student's happiness increases by g_{ij} and the j-th student's happiness increases by g_{ji}. Your task is to find such initial order of students in the line that the total happiness of all students will be maximum in the end. Please note that some pair of students may have a talk several times. In the example above students 1 and 5 talk while they wait for the shower to open and while 3 has a shower.

Input

The input consists of five lines, each line contains five space-separated integers: the j-th number in the i-th line shows g_{ij} ($0 \le g_{ij} \le 10^5$). It is guaranteed that $g_{ii} = 0$ for all i.

Assume that the students are numbered from 1 to 5.

Output

Print a single integer — the maximum possible total happiness of the students.

Examples

input

```
0 0 0 0 9
0 0 0 0 0
0 0 0 0 0
0 0 0 0 0
7 0 0 0 0
```

output

```
32
```

input

```
0 43 21 18 2
3 0 21 11 65
5 2 0 1 4
54 62 12 0 99
87 64 81 33 0
```

output

```
620
```

Note

In the first sample, the optimal arrangement of the line is 23154. In this case, the total happiness equals:

$$(g_{23} + g_{32} + g_{15} + g_{51}) + (g_{13} + g_{31} + g_{54} + g_{45}) + (g_{15} + g_{51}) + (g_{54} + g_{45}) = 32$$

.

C. k-Tree

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

Quite recently a creative student Lesha had a lecture on trees. After the lecture Lesha was inspired and came up with the tree of his own which he called a k-tree.

A k-tree is an infinite rooted tree where:

- each vertex has exactly k children;
- each edge has some weight;
- if we look at the edges that goes from some vertex to its children (exactly k edges), then their weights will equal $1, 2, 3, \ldots, k$.

The picture below shows a part of a 3-tree.

As soon as Dima, a good friend of Lesha, found out about the tree, he immediately wondered: "How many paths of total weight n (the sum of all weights of the edges in the path) are there, starting from the root of a k-tree and also containing at least one edge of weight at least d?".
Help Dima find an answer to his question. As the number of ways can be rather large, print it modulo 1000000007 ($10^9 + 7$).

Input

A single line contains three space-separated integers: n, k and d ($1 \le n, k \le 100$; $1 \le d \le k$).

Output

Print a single integer — the answer to the problem modulo 1000000007 ($10^9 + 7$).

Examples

input
3 3 2
output
3

input
3 3 3
output
1

input
4 3 2
output
6

input
4 5 2
output
7

D. Random Task

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

One day, after a difficult lecture a diligent student Sasha saw a graffitied desk in the classroom. She came closer and read: "Find such positive integer n, that among numbers $n + 1$, $n + 2$, ..., $2 \cdot n$ there are exactly m numbers which binary representation contains exactly k digits one".

The girl got interested in the task and she asked you to help her solve it. Sasha knows that you are afraid of large numbers, so she guaranteed that there is an answer that doesn't exceed 10^{18}.

Input

The first line contains two space-separated integers, m and k ($0 \le m \le 10^{18}$; $1 \le k \le 64$).

Output

Print the required number n ($1 \le n \le 10^{18}$). If there are multiple answers, print any of them.

Examples

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

input
```
3 2
```
output
```
5
```

E. Chemistry Experiment

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

One day two students, Grisha and Diana, found themselves in the university chemistry lab. In the lab the students found n test tubes with mercury numbered from 1 to n and decided to conduct an experiment.

The experiment consists of q steps. On each step, one of the following actions occurs:

1. Diana pours all the contents from tube number p_i and then pours there exactly x_i liters of mercury.
2. Let's consider all the ways to add v_i liters of water into the tubes; for each way let's count the volume **of liquid** (water and mercury) in the tube **with water** with maximum amount of liquid; finally let's find the minimum among counted maximums. That is the number the students want to count. At that, the students don't actually pour the mercury. They perform calculations without changing the contents of the tubes.

Unfortunately, the calculations proved to be too complex and the students asked you to help them. Help them conduct the described experiment.

Input

The first line contains two integers n and q ($1 \le n, q \le 10^5$) — the number of tubes ans the number of experiment steps. The next line contains n space-separated integers: $h_1, h_2, \ldots, h_n$ ($0 \le h_i \le 10^9$), where h_i is the volume of mercury in the i-th tube at the beginning of the experiment.

The next q lines contain the game actions in the following format:

- A line of form "$1\ p_i\ x_i$" means an action of the first type ($1 \le p_i \le n$; $0 \le x_i \le 10^9$).
- A line of form "$2\ v_i$" means an action of the second type ($1 \le v_i \le 10^{15}$).

It is guaranteed that there is at least one action of the second type. It is guaranteed that all numbers that describe the experiment are integers.

Output

For each action of the second type print the calculated value. The answer will be considered correct if its relative or absolute error doesn't exceed 10^{-4}.

Examples

input

```
3 3
1 2 0
2 2
1 2 1
2 3
```

output

```
1.50000
1.66667
```

input

```
4 5
1 3 0 1
2 3
2 1
1 3 2
2 3
2 4
```

output

```
1.66667
1.00000
2.33333
2.66667
```