# A. Vasily the Bear and Triangle

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

Vasily the bear has a *favorite rectangle*, it has one vertex at point $(0, 0)$, and the opposite vertex at point $(x, y)$. Of course, the sides of Vasya's favorite rectangle are parallel to the coordinate axes.

Vasya also loves triangles, if the triangles have one vertex at point $B = (0, 0)$. That's why today he asks you to find two points $A = (x_1, y_1)$ and $C = (x_2, y_2)$, such that the following conditions hold:

- the coordinates of points: $x_1$, $x_2$, $y_1$, $y_2$ are integers. Besides, the following inequation holds: $x_1 < x_2$;
- the triangle formed by point $A$, $B$ and $C$ is rectangular and isosceles ($\angle ABC$ is right);
- all points of the favorite rectangle are located inside or on the border of triangle $ABC$;
- the area of triangle $ABC$ is as small as possible.

Help the bear, find the required points. It is not so hard to proof that these points are unique.

### Input
The first line contains two integers $x, y$ ($-10^9 \le x, y \le 10^9, x \ne 0, y \ne 0$).

### Output
Print in the single line four integers $x_1, y_1, x_2, y_2$ — the coordinates of the required points.

### Examples

input
```
10 5
```
output
```
0 15 15 0
```

input
```
-10 5
```
output
```
-15 0 0 15
```

### Note

Figure to the first sample

# B. Vasily the Bear and Fly

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

One beautiful day Vasily the bear painted $2m$ circles of the same radius $R$ on a coordinate plane. Circles with numbers from $1$ to $m$ had centers at points $(2R - R, 0)$, $(4R - R, 0)$, ..., $(2Rm - R, 0)$, respectively. Circles with numbers from $m + 1$ to $2m$ had centers at points $(2R - R, 2R)$, $(4R - R, 2R)$, ..., $(2Rm - R, 2R)$, respectively.

Naturally, the bear painted the circles for a simple experiment with a fly. The experiment continued for $m^2$ days. Each day of the experiment got its own unique number from $0$ to $m^2 - 1$, inclusive.

On the day number $i$ the following things happened:

1. The fly arrived at the coordinate plane at the center of the circle with number $v = \lfloor \frac{i}{m} \rfloor + 1$ ($\lfloor \frac{x}{y} \rfloor$ is the result of dividing number $x$ by number $y$, rounded down to an integer).
2. The fly went along the coordinate plane to the center of the circle number $u = m + 1 + (i \mod m)$ ($x \mod y$ is the remainder after dividing number $x$ by number $y$). The bear noticed that the fly went from the center of circle $v$ to the center of circle $u$ along the shortest path with all points lying on the border or inside at least one of the $2m$ circles. After the fly reached the center of circle $u$, it flew away in an unknown direction.

Help Vasily, count the average distance the fly went along the coordinate plane during each of these $m^2$ days.

## Input

The first line contains two integers $m, R$ ($1 \le m \le 10^5$, $1 \le R \le 10$).

## Output

In a single line print a single real number — the answer to the problem. The answer will be considered correct if its absolute or relative error doesn't exceed $10^{-6}$.

### Examples

**input**
```
1 1
```
**output**
```
2.0000000000
```

**input**
```
2 2
```
**output**
```
5.4142135624
```

## Note

Figure to the second sample

# C. Vasily the Bear and Sequence

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

Vasily the bear has got a sequence of positive integers $a_1, a_2, \ldots, a_n$. Vasily the Bear wants to write out several numbers on a piece of paper so that the beauty of the numbers he wrote out was maximum.

The *beauty* of the written out numbers $b_1, b_2, \ldots, b_k$ is such maximum non-negative integer $v$, that number $b_1$ *and* $b_2$ *and* ... *and* $b_k$ is divisible by number $2^v$ without a remainder. If such number $v$ doesn't exist (that is, for any non-negative integer $v$, number $b_1$ *and* $b_2$ *and* ... *and* $b_k$ is divisible by $2^v$ without a remainder), the beauty of the written out numbers equals -1.

Tell the bear which numbers he should write out so that the beauty of the written out numbers is maximum. If there are multiple ways to write out the numbers, you need to choose the one where the bear writes out as many numbers as possible.

Here expression $x$ *and* $y$ means applying the bitwise AND operation to numbers $x$ and $y$. In programming languages C++ and Java this operation is represented by "&", in Pascal — by "and".

### Input

The first line contains integer $n$ ($1 \le n \le 10^5$). The second line contains $n$ space-separated integers $a_1, a_2, \ldots, a_n$ ($1 \le a_1 < a_2 < \ldots < a_n \le 10^9$).

### Output

In the first line print a single integer $k$ ($k > 0$), showing how many numbers to write out. In the second line print $k$ integers $b_1, b_2, \ldots, b_k$ — the numbers to write out. You are allowed to print numbers $b_1, b_2, \ldots, b_k$ in any order, but all of them must be distinct. If there are multiple ways to write out the numbers, choose the one with the maximum number of numbers to write out. If there still are multiple ways, you are allowed to print any of them.

#### Examples

**input**

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

**output**

```
2
4 5
```

**input**

```
3
1 2 4
```

**output**

```
1
4
```

# D. Vasily the Bear and Beautiful Strings

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

Vasily the Bear loves *beautiful* strings. String $s$ is *beautiful* if it meets the following criteria:

1. String $s$ only consists of characters $0$ and $1$, at that character $0$ must occur in string $s$ exactly $n$ times, and character $1$ must occur exactly $m$ times.
2. We can obtain character $g$ from string $s$ with some (possibly, zero) number of modifications. The character $g$ equals either zero or one.

A *modification* of string with length at least two is the following operation: we replace two last characters from the string by exactly one other character. This character equals one if it replaces two zeros, otherwise it equals zero. For example, one modification transforms string "01010" into string "0100", two modifications transform it to "011". It is forbidden to modify a string with length less than two.

Help the Bear, count the number of *beautiful* strings. As the number of beautiful strings can be rather large, print the remainder after dividing the number by $1000000007$ $(10^9 + 7)$.

## Input

The first line of the input contains three space-separated integers $n, m, g$ $(0 \le n, m \le 10^5, n + m \ge 1, 0 \le g \le 1)$.

## Output

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

### Examples

**input**
```
1 1 0
```
**output**
```
2
```

**input**
```
2 2 0
```
**output**
```
4
```

**input**
```
1 1 1
```
**output**
```
0
```

## Note

In the first sample the beautiful strings are: "01", "10".

In the second sample the beautiful strings are: "0011", "1001", "1010", "1100".

In the third sample there are no beautiful strings.

# E. Vasily the Bear and Painting Square

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

Vasily the bear has two favorite integers $n$ and $k$ and a pencil. Besides, he's got $k$ jars with different water color paints. All jars are numbered in some manner from $1$ to $k$, inclusive. The jar number $i$ contains the paint of the $i$-th color.

Initially the bear took a pencil and drew four segments on the coordinate plane. All of them end at point $(0, 0)$. They begin at: $(0, 2^n)$, $(0, -2^n)$, $(2^n, 0)$, $(-2^n, 0)$. Then for each $i = 1, 2, ..., n$, the bear drew two squares. The first square has the following vertex coordinates: $(2^i, 0)$, $(-2^i, 0)$, $(0, -2^i)$, $(0, 2^i)$. The second square has the following vertex coordinates: $(-2^{i-1}, -2^{i-1})$, $(-2^{i-1}, 2^{i-1})$, $(2^{i-1}, -2^{i-1})$, $(2^{i-1}, 2^{i-1})$. After that, the bear drew another square: $(1, 0)$, $(-1, 0)$, $(0, -1)$, $(0, 1)$. All points mentioned above form the set of points $A$.

The sample of the final picture at $n = 0$

The sample of the final picture at $n = 2$

The bear decided to paint the resulting picture in $k$ moves. The $i$-th move consists of the following stages:

1. The bear chooses 3 distinct points in set $A$ so that any pair of the chosen points has a segment on the picture between them. The chosen points and segments mark the area that mustn't contain any previously painted points.
2. The bear paints the area bounded by the chosen points and segments the $i$-th color.

Note that after the $k$-th move some parts of the picture can stay unpainted.

The bear asked you to calculate, how many distinct ways there are to paint his picture. A way to paint the picture is a sequence of three-element sets of points he chose on each step. Two sequences are considered distinct if there is such number $i$ ($1 \le i \le k$), that the $i$-th members of these sequences do not coincide as sets. As the sought number can be rather large, you only need to calculate the remainder after dividing it by number $1000000007$ ($10^9 + 7$).

### Input

The first line contains two integers $n$ and $k$, separated by a space ($0 \le n, k \le 200$).

### Output

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

#### Examples

**input**
```
0 0
```
**output**
```
1
```

**input**
```
0 1
```
**output**
```
8
```

**input**
```
0 2
```
**output**
```
32
```

**input**
```
1 1
```
**output**
```
32
```