Codeforces Round #287 (Div. 2)

A. Amr and Music

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

Amr is a young coder who likes music a lot. He always wanted to learn how to play music but he was busy coding so he got an idea.

Amr has n instruments, it takes a_i days to learn i-th instrument. Being busy, Amr dedicated k days to learn how to play the maximum possible number of instruments.

Amr asked for your help to distribute his free days between instruments so that he can achieve his goal.

Input

The first line contains two numbers n, k ($1 \le n \le 100$, $0 \le k \le 10\,000$), the number of instruments and number of days respectively.

The second line contains n integers a_i ($1 \le a_i \le 100$), representing number of days required to learn the i-th instrument.

Output

In the first line output one integer m representing the maximum number of instruments Amr can learn.

In the second line output m space-separated integers: the indices of instruments to be learnt. You may output indices in any order.

if there are multiple optimal solutions output any. It is not necessary to use all days for studying.

Examples

input
4 10 4 3 1 2
output
4 1 2 3 4

input
5 6 4 3 1 1 2
output
3 1 3 4

input
1 3 4
output
0

Note

In the first test Amr can learn all 4 instruments.

In the second test other possible solutions are: $\{2, 3, 5\}$ or $\{3, 4, 5\}$.

In the third test Amr doesn't have enough time to learn the only presented instrument.

B. Amr and Pins

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

Amr loves Geometry. One day he came up with a very interesting problem.

Amr has a circle of radius r and center in point (x, y). He wants the circle center to be in new position (x', y').

In one step Amr can put a pin to the border of the circle in a certain point, then rotate the circle around that pin by any angle and finally remove the pin.

Help Amr to achieve his goal in minimum number of steps.

Input

Input consists of 5 space-separated integers $r, x, y, x' y'$ ($1 \le r \le 10^5$, $-10^5 \le x, y, x', y' \le 10^5$), circle radius, coordinates of original center of the circle and coordinates of destination center of the circle respectively.

Output

Output a single integer — minimum number of steps required to move the center of the circle to the destination point.

Examples

input
2 0 0 0 4
output
1

input
1 1 1 4 4
output
3

input
4 5 6 5 6
output
0

Note

In the first sample test the optimal way is to put a pin at point $(0, 2)$ and rotate the circle by 180 degrees counter-clockwise (or clockwise, no matter).

C. Guess Your Way Out!

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

Amr bought a new video game "Guess Your Way Out!". The goal of the game is to find an exit from the maze that looks like a perfect binary tree of height h. The player is initially standing at the root of the tree and the exit from the tree is located at some leaf node.

Let's index all the leaf nodes from the left to the right from 1 to 2^h. The exit is located at some node n where $1 \le n \le 2^h$, the player doesn't know where the exit is so he has to guess his way out!

Amr follows simple algorithm to choose the path. Let's consider infinite command string "LRLRLRLRL..." (consisting of alternating characters 'L' and 'R'). Amr sequentially executes the characters of the string using following rules:

- Character 'L' means "go to the left child of the current node";
- Character 'R' means "go to the right child of the current node";
- If the destination node is already visited, Amr skips current command, otherwise he moves to the destination node;
- If Amr skipped two consecutive commands, he goes back to the parent of the current node before executing next command;
- If he reached a leaf node that is not the exit, he returns to the parent of the current node;
- If he reaches an exit, the game is finished.

Now Amr wonders, if he follows this algorithm, how many nodes he is going to visit before reaching the exit?

Input

Input consists of two integers h, n ($1 \le h \le 50$, $1 \le n \le 2^h$).

Output

Output a single integer representing the number of nodes (excluding the exit node) Amr is going to visit before reaching the exit by following this algorithm.

Examples

input
1 2
output
2

input
2 3
output
5

input
3 6
output
10

input
10 1024
output
2046

Note

A perfect binary tree of height h is a binary tree consisting of $h + 1$ levels. Level 0 consists of a single node called *root*, level h consists of 2^h nodes called *leaves*. Each node that is not a leaf has exactly two children, *left* and *right* one.

Following picture illustrates the sample test number 3. Nodes are labeled according to the order of visit.

D. The Maths Lecture

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

Amr doesn't like Maths as he finds it really boring, so he usually sleeps in Maths lectures. But one day the teacher suspected that Amr is sleeping and asked him a question to make sure he wasn't.

First he gave Amr two positive integers n and k. Then he asked Amr, how many integer numbers $x > 0$ exist such that:

- Decimal representation of x (without leading zeroes) consists of exactly n digits;
- There exists some integer $y > 0$ such that:
  - $y \bmod k = 0$;
  - decimal representation of y is a *suffix* of decimal representation of x.

As the answer to this question may be pretty huge the teacher asked Amr to output only its remainder modulo a number m.

Can you help Amr escape this embarrassing situation?

Input

Input consists of three integers n, k, m ($1 \le n \le 1000$, $1 \le k \le 100$, $1 \le m \le 10^9$).

Output

Print the required number modulo m.

Examples

input
1 2 1000
output
4

input
2 2 1000
output
45

input
5 3 1103
output
590

Note

A suffix of a string S is a non-empty string that can be obtained by removing some number (possibly, zero) of first characters from S.

E. Breaking Good

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

Breaking Good is a new video game which a lot of gamers want to have. There is a certain level in the game that is really difficult even for experienced gamers.

Walter William, the main character of the game, wants to join a gang called Los Hermanos (The Brothers). The gang controls the whole country which consists of n cities with m bidirectional roads connecting them. There is no road is connecting a city to itself and for any two cities there is at most one road between them. The country is connected, in the other words, it is possible to reach any city from any other city using the given roads.

The roads aren't all working. There are some roads which need some more work to be performed to be completely functioning.

The gang is going to rob a bank! The bank is located in city 1. As usual, the hardest part is to escape to their headquarters where the police can't get them. The gang's headquarters is in city n. To gain the gang's trust, Walter is in charge of this operation, so he came up with a smart plan.

First of all the path which they are going to use on their way back from city 1 to their headquarters n must be *as short as possible*, since it is important to finish operation as fast as possible.

Then, gang has to blow up all other roads in country that don't lay on this path, in order to prevent any police reinforcements. In case of non-working road, they don't have to blow up it as it is already malfunctional.

If the chosen path has some roads that doesn't work they'll have to repair those roads before the operation.

Walter discovered that there was a lot of paths that satisfied the condition of being shortest possible so he decided to choose among them a path that minimizes the total number of affected roads (both roads that have to be blown up and roads to be repaired).

Can you help Walter complete his task and gain the gang's trust?

Input

The first line of input contains two integers n, m ($2 \le n \le 10^5$, $0 \le m \le \min(\frac{n(n-1)}{2}, 10^5)$), the number of cities and number of roads respectively.

In following m lines there are descriptions of roads. Each description consists of three integers x, y, z ($1 \le x, y \le n$, $z \in \{0, 1\}$) meaning that there is a road connecting cities number x and y. If $z = 1$, this road is working, otherwise it is not.

Output

In the first line output one integer k, the minimum possible number of roads affected by gang.

In the following k lines output three integers describing roads that should be affected. Each line should contain three integers x, y, z ($1 \le x, y \le n$, $z \in \{0, 1\}$), cities connected by a road and the new state of a road. $z = 1$ indicates that the road between cities x and y should be repaired and $z = 0$ means that road should be blown up.

You may output roads in any order. Each affected road should appear exactly once. You may output cities connected by a single road in any order. If you output a road, it's original state should be different from z.

After performing all operations accroding to your plan, there should remain working only roads lying on some certain shortest past between city 1 and n.

If there are multiple optimal answers output any.

Examples

input
2 1 1 2 0
output
1 1 2 1

input
4 4 1 2 1 1 3 0 2 3 1 3 4 1
output
3

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

input

```
8 9
1 2 0
8 3 0
2 3 1
1 4 1
8 7 0
1 5 1
4 6 1
5 7 0
6 8 0
```

output

```
3
2 3 0
1 5 0
6 8 1
```

Note

In the first test the only path is 1 - 2

In the second test the only shortest path is 1 - 3 - 4

In the third test there are multiple shortest paths but the optimal is 1 - 4 - 6 - 8