# A. Expression

time limit per test: 1 second

memory limit per test: 256 megabytes

input: standard input

output: standard output

Petya studies in a school and he adores Maths. His class has been studying arithmetic expressions. On the last class the teacher wrote three positive integers $a$, $b$, $c$ on the blackboard. The task was to insert signs of operations '+' and '*', and probably brackets between the numbers so that the value of the resulting expression is as large as possible. Let's consider an example: assume that the teacher wrote numbers 1, 2 and 3 on the blackboard. Here are some ways of placing signs and brackets:

- 1+2*3=7
- 1*(2+3)=5
- 1*2*3=6
- (1+2)*3=9

Note that you can insert operation signs only between $a$ and $b$, and between $b$ and $c$, that is, you cannot swap integers. For instance, in the given sample you cannot get expression (1+3)*2.

It's easy to see that the maximum value that you can obtain is 9.

Your task is: given $a$, $b$ and $c$ print the maximum value that you can get.

### Input

The input contains three integers $a$, $b$ and $c$, each on a single line ($1 \le a, b, c \le 10$).

### Output

Print the maximum value of the expression that you can obtain.

### Sample test(s)

input
```
1
2
3
```
output
```
9
```

input
```
2
10
3
```
output
```
60
```

# B. Towers

As you know, all the kids in Berland love playing with cubes. Little Petya has $n$ towers consisting of cubes of the same size. Tower with number $i$ consists of $a_i$ cubes stacked one on top of the other. Petya defines the *instability* of a set of towers as a value equal to the difference between the heights of the highest and the lowest of the towers. For example, if Petya built five cube towers with heights (8, 3, 2, 6, 3), the instability of this set is equal to 6 (the highest tower has height 8, the lowest one has height 2).

The boy wants the instability of his set of towers to be as low as possible. All he can do is to perform the following operation several times: take the top cube from some tower and put it on top of some other tower of his set. Please note that Petya would never put the cube on the same tower from which it was removed because he thinks it's a waste of time.

Before going to school, the boy will have time to perform no more than $k$ such operations. Petya does not want to be late for class, so you have to help him accomplish this task.

### Input

The first line contains two space-separated positive integers $n$ and $k$ ($1 \le n \le 100$, $1 \le k \le 1000$) — the number of towers in the given set and the maximum number of operations Petya can perform. The second line contains $n$ space-separated positive integers $a_i$ ($1 \le a_i \le 10^4$) — the towers' initial heights.

### Output

In the first line print two space-separated non-negative integers $s$ and $m$ ($m \le k$). The first number is the value of the minimum possible instability that can be obtained after performing at most $k$ operations, the second number is the number of operations needed for that.

In the next $m$ lines print the description of each operation as two positive integers $i$ and $j$, each of them lies within limits from $1$ to $n$. They represent that Petya took the top cube from the $i$-th tower and put in on the $j$-th one ($i \ne j$). Note that in the process of performing operations the heights of some towers can become equal to zero.

If there are multiple correct sequences at which the minimum possible instability is achieved, you are allowed to print any of them.

### Sample test(s)

| input |
|-------|
| 3 2 |
| 5 8 5 |

| output |
|--------|
| 0 2 |
| 2 1 |
| 2 3 |

| input |
|-------|
| 3 4 |
| 2 2 4 |

| output |
|--------|
| 1 1 |
| 3 2 |

| input |
|-------|
| 5 3 |
| 8 3 2 6 3 |

| output |
|--------|
| 3 3 |
| 1 3 |
| 1 2 |
| 1 3 |

### Note

In the first sample you need to move the cubes two times, from the second tower to the third one and from the second one to the first one. Then the heights of the towers are all the same and equal to 6.

# C. Exams

Student Valera is an undergraduate student at the University. His end of term exams are approaching and he is to pass exactly $n$ exams. Valera is a smart guy, so he will be able to pass any exam he takes on his first try. Besides, he can take several exams on one day, and in any order.

According to the schedule, a student can take the exam for the $i$-th subject on the day number $a_i$. However, Valera has made an arrangement with each teacher and the teacher of the $i$-th subject allowed him to take an exam before the schedule time on day $b_i$ ($b_i < a_i$). Thus, Valera can take an exam for the $i$-th subject either on day $a_i$, or on day $b_i$. All the teachers put the record of the exam in the student's record book on the day of the actual exam and write down the date of the mark as number $a_i$.

Valera believes that it would be rather strange if the entries in the record book did not go in the order of non-decreasing date. Therefore Valera asks you to help him. Find the minimum possible value of the day when Valera can take the final exam if he takes exams so that all the records in his record book go in the order of non-decreasing date.

## Input

The first line contains a single positive integer $n$ ($1 \le n \le 5000$) — the number of exams Valera will take.

Each of the next $n$ lines contains two positive space-separated integers $a_i$ and $b_i$ ($1 \le b_i < a_i \le 10^9$) — the date of the exam in the schedule and the early date of passing the $i$-th exam, correspondingly.

## Output

Print a single integer — the minimum possible number of the day when Valera can take the last exam if he takes all the exams so that all the records in his record book go in the order of non-decreasing date.

## Sample test(s)

| input |
| --- |
| 3 |
| 5  2 |
| 3  1 |
| 4  2 |

| output |
| --- |
| 2 |

| input |
| --- |
| 3 |
| 6  1 |
| 5  2 |
| 4  3 |

| output |
| --- |
| 6 |

## Note

In the first sample Valera first takes an exam in the second subject on the first day (the teacher writes down the schedule date that is 3). On the next day he takes an exam in the third subject (the teacher writes down the schedule date, 4), then he takes an exam in the first subject (the teacher writes down the mark with date 5). Thus, Valera takes the last exam on the second day and the dates will go in the non-decreasing order: 3, 4, 5.

In the second sample Valera first takes an exam in the third subject on the fourth day. Then he takes an exam in the second subject on the fifth day. After that on the sixth day Valera takes an exam in the first subject.

# D. Long Jumps

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

Valery is a PE teacher at a school in Berland. Soon the students are going to take a test in long jumps, and Valery has lost his favorite ruler!

However, there is no reason for disappointment, as Valery has found another ruler, its length is $l$ centimeters. The ruler already has $n$ marks, with which he can make measurements. We assume that the marks are numbered from 1 to $n$ in the order they appear from the beginning of the ruler to its end. The first point coincides with the beginning of the ruler and represents the origin. The last mark coincides with the end of the ruler, at distance $l$ from the origin. This ruler can be repesented by an increasing sequence $a_1, a_2, ..., a_n$, where $a_i$ denotes the distance of the $i$-th mark from the origin ($a_1 = 0$, $a_n = l$).

Valery believes that with a ruler he can measure the distance of $d$ centimeters, if there is a pair of integers $i$ and $j$ ($1 \le i \le j \le n$), such that the distance between the $i$-th and the $j$-th mark is exactly equal to $d$ (in other words, $a_j - a_i = d$).

Under the rules, the girls should be able to jump at least $x$ centimeters, and the boys should be able to jump at least $y$ ($x < y$) centimeters. To test the children's abilities, Valery needs a ruler to measure each of the distances $x$ and $y$.

Your task is to determine what is the minimum number of additional marks you need to add on the ruler so that they can be used to measure the distances $x$ and $y$. Valery can add the marks at any integer non-negative distance from the origin not exceeding the length of the ruler.

### Input

The first line contains four positive space-separated integers $n, l, x, y$ ($2 \le n \le 10^5$, $2 \le l \le 10^9$, $1 \le x < y \le l$) — the number of marks, the length of the ruler and the jump norms for girls and boys, correspondingly.

The second line contains a sequence of $n$ integers $a_1, a_2, ..., a_n$ ($0 = a_1 < a_2 < ... < a_n = l$), where $a_i$ shows the distance from the $i$-th mark to the origin.

### Output

In the first line print a single non-negative integer $v$ — the minimum number of marks that you need to add on the ruler.

In the second line print $v$ space-separated integers $p_1, p_2, ..., p_v$ ($0 \le p_i \le l$). Number $p_i$ means that the $i$-th mark should be at the distance of $p_i$ centimeters from the origin. Print the marks in any order. If there are multiple solutions, print any of them.

### Sample test(s)

| input |
| --- |
| 3 250 185 230 |
| 0 185 250 |
| output |
| 1 |
| 230 |

| input |
| --- |
| 4 250 185 230 |
| 0 20 185 250 |
| output |
| 0 |

| input |
| --- |
| 2 300 185 230 |
| 0 300 |
| output |
| 2 |
| 185 230 |

### Note

In the first sample it is impossible to initially measure the distance of $230$ centimeters. For that it is enough to add a $20$ centimeter mark or a $230$ centimeter mark.

In the second sample you already can use the ruler to measure the distances of $185$ and $230$ centimeters, so you don't have to add new marks.

In the third sample the ruler only contains the initial and the final marks. We will need to add two marks to be able to test the children's skills.

# E. Riding in a Lift

Imagine that you are in a building that has exactly $n$ floors. You can move between the floors in a lift. Let's number the floors from bottom to top with integers from $1$ to $n$. Now you're on the floor number $a$. You are very bored, so you want to take the lift. Floor number $b$ has a secret lab, the entry is forbidden. However, you already are in the mood and decide to make $k$ consecutive trips in the lift.

Let us suppose that at the moment you are on the floor number $x$ (initially, you were on floor $a$). For another trip between floors you choose some floor with number $y$ ($y \neq x$) and the lift travels to this floor. As you cannot visit floor $b$ with the secret lab, you decided that the distance from the current floor $x$ to the chosen $y$ must be strictly less than the distance from the current floor $x$ to floor $b$ with the secret lab. Formally, it means that the following inequation must fulfill: $|x - y| < |x - b|$. After the lift successfully transports you to floor $y$, you write down number $y$ in your notepad.

Your task is to find the number of distinct number sequences that you could have written in the notebook as the result of $k$ trips in the lift. As the sought number of trips can be rather large, find the remainder after dividing the number by $1000000007$ ($10^9 + 7$).

## Input

The first line of the input contains four space-separated integers $n, a, b, k$ ($2 \leq n \leq 5000, 1 \leq k \leq 5000, 1 \leq a, b \leq n, a \neq b$).

## Output

Print a single integer — the remainder after dividing the sought number of sequences by $1000000007$ ($10^9 + 7$).

## Sample test(s)

| input |
| --- |
| 5 2 4 1 |

| output |
| --- |
| 2 |

| input |
| --- |
| 5 2 4 2 |

| output |
| --- |
| 2 |

| input |
| --- |
| 5 3 4 1 |

| output |
| --- |
| 0 |

## Note

Two sequences $p_1, p_2, ..., p_k$ and $q_1, q_2, ..., q_k$ are *distinct*, if there is such integer $j$ ($1 \leq j \leq k$), that $p_j \neq q_j$.

**Notes to the samples**:

1. In the first sample after the first trip you are either on floor $1$, or on floor $3$, because $|1 - 2| < |2 - 4|$ and $|3 - 2| < |2 - 4|$.
2. In the second sample there are two possible sequences: $(1, 2)$; $(1, 3)$. You cannot choose floor $3$ for the first trip because in this case no floor can be the floor for the second trip.
3. In the third sample there are no sought sequences, because you cannot choose the floor for the first trip.

---