Problem A. Ancient

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Red`

In the hushed sands of time, a story unfolds, tracing back over 5,000 years to the birth of an ancient civilization along the banks of the Nile. Egypt's history, steeped in mystery and grandeur, weaves tales of ancient Egyptians, pyramids, and a timeless legacy that continues to captivate the world to this day. Taha, a determined archaeologist, and Mohamed, a young historian, unite to unravel Egypt's enigmatic past. Their shared journey leads them through the ages, revealing secrets that will reverberate through time, as they uncover the untold tales of the mighty ancient Egyptians and the lost wonders of an ancient world.

While Taha and Mohamed were exploring the ancient Egypt, they came across an array a of n integers. Taha, who loved mathematics, gave it to Mohamed and asked him to count the number of Tahanian subsets in the array. A Tahanian subset is a non-empty group of numbers from the array whose product is a perfect square.

Since Mohamed is occupied with exploring the ancient Egypt, he needs your help to solve the problem. Can you do it?

As the answer can be very big, print it modulo $1000000007(10^9 + 7)$.

Input

the first line contains a single integer n ($1 \leq n \leq 10^5$), the number of elements in the array a.

Then n integers separated by a space follow representing the elements of the array a ($1 \leq a_i \leq 10^3$).

Output

output an integer represents the number of Tahanian subsets in the array modulo $1000000007(10^9 + 7)$.

Examples

standard input	standard output
4 1 1 1 1	15
4 2 2 2 2	7
5 1 2 4 5 8	7

Problem B. Bolbitine

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Black`

Farah loved ancient history, especially the mysteries of ancient Egypt. She had always dreamed of visiting the Rosetta Stone, the famous slab that had three different scripts on it, and that had helped decipher the hieroglyphs. She had read a lot about its discovery in 1799, near the town of Bolbitine, also known as Rosetta or Rashid. She wondered what secrets it still hid, and what other clues it could reveal about the ancient civilization. One day, she found a game online that claimed to be based on the Rosetta Stone. The game was an $n \times m$ grid. The goal was to make d moves, the game is over, and your current score is your final score. Farah was intrigued by the game and decided to try it. She hoped that by playing it, she could learn more about the Rosetta Stone and its secrets.

Each cell in the grid has a score v that you win by being on the cell. For each move, if you choose to move in a specific direction, you go there with probability p, and you go to either of the two perpendicular positions to it with probability $\frac{1-p}{2}$.

For example, at p=0.5, if you go up, you go there with probability 0.5 and go to either right or left with probability 0.25.

Note that, score is not merely the sum of the individual cell scores, but it's the *expected score, which follows this formula:*

$$score_i = p_1 \times value_1 + p_2 \times value_2 + ... + p_i \times value_i$$

where p_i is probability of reaching $cell_i$ from the start, and $value_i$ is the individual score of $cell_i$.

You are only allowed to move up, down, left or right. If you hit a wall, you stay in the same cell.

There are also terminal cells, that whenever you reach, the game ends immediately (after you get the cell points).

Help Farah find the maximum expected score she can get given d and p and the initial cell. Note that the initial cell will never be a wall.

Input

The first line contains two integers, n and m, where $1 \leq n, m \leq 100$.

The second line contains two numbers, d and p, where d is an integer, $1 \leq d \leq 10$, and p is a float, $0 \leq p \leq 1$

The third line contains two integers, i and j, the coordinates of the starting cell, $1 \leq i \leq n$ and $1 \leq j \leq m$.

Each of the next n lines contains m characters. They describe the grid. If a character on a line equals "." then the corresponding cell is walkable, if the character equals "#" then the cell is a wall and if the character equals "" then the cell is terminal.*

There are another n lines, each containing m numbers that represent the score s of each cell, $-10^5 \leq s \leq 10^5$.

Output

Print the maximum expected score Farah can get, The answer will be considered correct if its absolute or relative error doesn't exceed 10^{-6}.

Examples

standard input	standard output
3 3 5 0.3 1 1 ..* ..* #.# 70 200 -200 0 100 500 50 -100 5	177.201719
2 2 1 0.5 1 1 .. .* 0 50 20 100	25.000000
1 1 5 0.5 1 1 . 50	98.437500

Problem C. Cleopatra

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Light Blue`

Once upon a time, there was a legendary queen named Cleopatra, ruling over ancient Egypt around 2,000 years ago, from 51 BCE to 30 BCE. Her story seems so ancient to us now. But wait, here's a fascinating twist! The great pyramids, those incredible structures, were already standing tall roughly 3,000 years before her era! That means her time is much closer to ours than it was to the age of those majestic pyramids. It's mind-boggling to think just how ancient those pyramids truly are!

Cleopatra never calculated the sum of five numbers because she hated math. Now that she is dead, you have to do it for her. Calculate the sum and print the result!

Input

One line contains five integers a, b, c, d, e $(1 \leq a, b, c, d, e \leq 100)$

Output

Print the summation.

Examples

standard input	standard output
1 2 3 4 5	15
1 3 2 10 10	26

Problem D. Djoser (Zoser)

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Purple`

Abo Taha was fascinated by ancient Egypt, especially by the pyramids. He had learned that the first pyramid ever built was the step pyramid of Djoser, a king who lived in the 27th century BCE. He had also learned that the architect of the pyramid was Imhotep, a genius who had designed a complex of stone structures around the pyramid. Abo Taha wondered how Imhotep had planned and executed such a monumental project, and what mathematical skills he had used.

Abo Taha decided to test his own mathematical skills by creating a game based on the stars. He invited his friend Ahmed to play with him. The game involved giving Ahmed n locations of stars in the sky, which could be represented as points on a 2-D plane.

Ahmed had to tell Abo Taha how many different 4-sided simple convex polygons he could make out of these n points. Abo Taha thought that this game would challenge Ahmed's spatial reasoning and geometry knowledge, as well as his creativity and imagination. However, Ahmed was not very interested in the game, nor in ancient Egypt. He was a lazy procrastinator who did not train well, and he was unable to solve the problem that Abo Taha gave him.

Ahmed knows that you are a geometry lover so he decided to give the problem to you in order to solve it, can you?

Input

first line of input contains one integer ($1 \leq n \leq 300$) representing the number of stars. then n lines follow, each line containing two space-separated integers ($-2 * 10^9 \leq x, y \leq 2 * 10^9$) representing the location of the $i - th$ star.

it is guaranteed that each star lies in a distinct location.

Output

output one integer representing the answer for the problem.

Examples

standard input	standard output
5 10 10 10 20 20 20 20 10 25 15	5
6 1 1 2 2 3 3 5 10 20 10 20 5	12
7 2 8 9 4 3 1 38 43 10 11 49 31 30 20	35

Problem E. Edfu

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Dark Green`

3abqreno and Manga were best friends who shared a passion for ancient Egypt. They had always wanted to visit the country and see its magnificent temples and pyramids. One day, they went to a museum that had an exhibition about Edfu, a city that had a huge temple dedicated to the god Horus.

They learned that the temple was aligned with the stars, and that the ancient Egyptians had used a device called a nilometer to measure the water level of the Nile. 3abqreno was impressed by how the ancient Egyptians had applied mathematics and astronomy to their religion and culture. He wished he could be as good at math as they were, especially at probability, which was his weakest subject. He had a homework problem that he had not been able to solve, which asked him to find the expected beauty of his subarrays. 3abqreno thought that maybe Manga could help him with the problem, since Manga was better at math than him. He showed him the problem and asked for his advice.

the beauty of a subarray with length l is initially zero. For every index i $(1 \leq i < l)$ and A_i, A_{i+1} have the same smallest prime factor, the beauty of the subarray increases by one.

3abqreno gets bored of static arrays so he will give you q queries of l and r and he wants you to find the expected value of the beauty of the subarray from l to r modulo 1000000007 if you shuffle it in every way possible.

Input

The first line contains two integers n,q $(1 \leq n, q \leq 10^5)$ — the size of the array and the number of queries.

The second line will contain n integers representing the array A $(1 \leq A_i \leq 10^6)$.

Each of the next q lines contains two integers l and r $(1 \leq l \leq r \leq n)$.

Output

print q lines containing the expected value of beauty for the given q queries.

It can be shown that the answer can be expressed as an irreducible fraction $\frac{p}{q}$, where p and q are integers and $q \not\equiv 0 \pmod{M}$. Output the integer equal to $p \cdot q^{-1} \bmod M$. In other words, output such an integer x that $0 \leq x < M$ and $x \cdot q \equiv p \pmod{M}$.

$M = 1000000007$.

Examples

standard input	standard output
5 3 1 2 3 4 5 1 3 2 4 1 5	0 666666672 800000006
6 3 5 55 16 12 4 8 1 2 3 6 1 6	1 3 333333338

Note

for the first test case :

the expected value of the first query is zero because no numbers share the smallest prime.

the expected value of the second query is $\frac{4}{6} = \frac{2}{3}$.

the expected value of the third query is $\frac{48}{120} = \frac{2}{5}$.

Problem F. Fayoum

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Yellow`

Malak was a young girl who loved to explore the ancient city of Fayoum, where she lived. She was fascinated by the natural and historical wonders that surrounded her, especially Wadi Al Hitan, the valley of the whales. There, she could see the fossilized remains of ancient marine creatures that had lived millions of years ago. She wondered what their lives were like, and how they had evolved into the whales that she had seen in books and movies. She also liked to play games with her friend Omar, who shared her curiosity and imagination. One of their favorite games was the Town Game, the game had two players, which they had invented themselves. The game involved a group of buildings that were arranged in a matrix of n rows and m columns. Each building in row i and column j has height hij, On top of the building there are Gij number of gold pieces .

The first player can choose any building from the first $n/2$ rows as a starting point, and the second player can choose any building from the second $n/2$ rows as a starting point.

if the player is stayed above building i, j then he could collect the gold above this building. and could move to another building x, y if and only if the next two conditions are satisfied

1. the building x, y is adjacent to the current building i, j.
2. the max height of the two buildings doesn't exceed 1.5 * the minimum one

But there is also a Super Power in the game that each player can use at most once. the super power will release the first condition for the player who use it, but in exchange for that the player will collect only half the quantity of gold above this building. the super power must be used before the player start collecting any gold.

The winning player is the one who collects more gold. your task is to find who will be the winner if the two players play optimal, or record that there is no winner.

Notes: 1) n is always will be given as even number.2) each player could collect the gold above any building at most one time, and This does not affect the gold that the other player can collect

Input

The first line contains two integer n and m ($2 \leq m, n \leq 1000$), number of rows and number of columns of matrices respectively.

The next n lines each contain m integers separated by spaces describing rows of matrix H that contain the heights of each building ($1 \leq Hij \leq 10^5$)

The next n lines each contain m integers separated by spaces describing rows of matrix G that contain the number of golds above each building ($1 \leq Gij \leq 10^5$).

Output

one integer represent the winner.

- if the first player win , out 1.
- if the second player win , out 2.
- if no one win , out 0.

Examples

standard input	standard output
4 4 1 2 3 200 2 3 10 220 11 12 15 300 140 150 270 250 100 200 300 10 250 150 100 20 30 50 10 30 15 13 12 35	1
4 3 5 6 9 100 110 120 300 330 400 3 4 10 100 100 100 50 50 50 10 10 10 10 10 10	1
6 3 2 3 4 12 13 14 30 31 32 400 1200 500 60 30 60 600 120 630 12 13 20 11 25 90 99 100 77 200 120 200 50 20 133 200 90 200	2

Problem G. Giza

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Gold`

In ancient history, Giza city witnessed humanity's most astounding achievement—the Great Pyramids. Over 4,500 years ago, the majestic structures of Khufu, Khafre, and Menkaure rose on the Giza Plateau, Egypt. As tombs for powerful kings, these remarkable pyramids showcased ancient Egyptian ingenuity and precision. Enduring through time, these iconic monuments captivate the world, a testament to the enigmatic allure of ancient engineering prowess.

When Farah was nearby Khufu, she found an integer n and an integer t and asked you to determine the number of binary strings of length n that contain exactly t flips. The answer might be very large, so print it modulo $10^9 + 7$.

A flip is any two adjacent bits that are different. For example, 010 contains 2 flips: 01 and 10.

A binary string is a string containing zeros and ones only.

Input

The only line of the input contains two integers n and t ($1 \leq t < n \leq 10^6$).

Output

Print the answer modulo $10^9 + 7$.

Examples

standard input	standard output
3 2	2
1000 5	79472972

Note

In the first test case, for n=3 and t=2, the only two possible strings are 010 and 101.

Problem H. Heliopolis

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`White`

Long ago, the city of Heliopolis stood tall in what is now Cairo. It had big stone pillars that reached for the sky, showing people's interest in the stars and the sun. It was a place full of learning and big ideas. Heliopolis still leaves a mark on history, inviting us all to dig deeper and learn more about the past.

Once upon a time at the microprocessors' lab, Abo-Hafiza, the TA, assigned the students two tasks. Hamdy and his friends were bored and eager to leave as soon as possible, so they decided to help each other out. However, when Abo-Hafiza discovered their collaboration, he became extremely angry and decided that no one can leave until the following is satisfied:

- every student should do the two tasks of the assignment.
- if there are two assignments, the first assignment solved by a student A for the first task, and the second task solved by another student B and there was another assignment where student B solved the first task, and another student C solved the second task. Then, a new assignment must be delivered jointly by students A and C, where A solves the first task, and C solves the second task.

More formally, let's represent the students by their IDs, and an assignment solved by two students i and j as (ID_i, ID_j), indicating that student i solved the first task and student j solved the second task. Therefore, if there are n students the assignments that should be delivered are:

- a student i should deliver an assignment (ID_i, ID_i), $1 \leq i \leq n$.
- if there exist two assignments solved by (ID_i, ID_j) and (ID_j, ID_k), a new assignment should be delivered by (ID_i, ID_k) if it isn't already delivered , $1 \leq i \leq j \leq k \leq n$.

Given n assignments find the additional assignments that should be delivered.

Input

The first line contains two integers n and m ($1 \leq n \leq 1000, 0 \leq m \leq min(1000, \frac{n(n+1)}{2})$), the number of students and the number of currently delivered assignments.

The i-th of the following m lines of input contains a pair of integers ID_a and ID_b ($1 \leq ID_a \leq ID_b \leq n$), The IDs of the the students who delivered the i-th assignment where student whose ID is ID_a did the first task and the student whose ID is ID_b did the second task.

Output

The first line contains an integer k, the number of additional assignments that should be delivered.

each of the following k lines of output contains a pair of integers ID_a and ID_b, where student whose ID is ID_a should do the first task and the the other whose ID is ID_b should do the second task.

You may print the answer in any order.

Examples

standard input	standard output
5 4 1 2 2 3 1 4 4 5	7 1 1 1 3 1 5 2 2 3 3 4 4 5 5
4 5 1 2 2 3 3 1 1 4 3 4	8 1 1 1 3 2 1 2 2 2 4 3 2 3 3 4 4

Problem I. Imhotep

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Silver`

Imhotep was a brilliant man who served as the chief minister, architect, and physician of King Djoser in ancient Egypt. He designed the first step pyramid at Saqqara, which was a marvel of engineering and a symbol of royal power. He was also skilled in astronomy, mathematics, and medicine, and wrote many books on various subjects. Imhotep was facing a complex problem, but unfortunately, he passed away before he could solve it. Now, it's your mission to solve Imhotep's complex problem.

Ossama decided to solve Imhotep's problem, Osama given a pot and two large bottles of cold and hot water with maximum capacities of x_1 and x_2 and temperatures t_1 and t_2, respectively. He told him that being wise is being able to balance the capacities of hot and cold water poured into the pot to get the nearest temperature possible to t_0, according to the following equation:

$$\frac{y_1 * t_1 + y_2 * t_2}{y_1 + y_2}$$

where y_1 and y_2 are the capacities taken from the cold and hot bottles, respectively. Also, the balanced-out temperature *should not* be lower than t0. Can you help Ossama to solve Imhotep's complex problem?

If there exists more than one optimal solution, print the one with the largest total capacity.

Input

The only input line contains five integers t_1,t_2,x_1,x_2,t_0 ($1 \leq t_1 \leq t_0 \leq t_2 \leq 10^6, 1 \leq x_1, x_2 \leq 10^6$)

Output

Print two spaced integers representing the optimal capacities required from each bottle y_1 and y_2 ($0 \leq y_1 \leq x_1, 0 \leq y_2 \leq x_2$)

Examples

standard input	standard output
10 70 100 100 25	99 33
300 500 1000 1000 300	1000 0
143 456 110 117 273	76 54

Problem J. Jewels

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Orange`

Diving into ancient Egypt's rich past, we've discovered so many jewels. Yet, much more is still hidden waiting for you to uncover. Take a tour on the Nile. Ancient wonders abound, a tapestry of history. Carved in stone, secrets veiled in mystery. A journey through time, on the majestic Nile.

Eka was given an **odd** integer a. He needs to determine whether there exist two integers x and y such that x^2 - $y^2 = a$. If such integers exist, he also needs to find the values of x and y.

Write a program to help Eka solve this problem.

Input

The input consists of multiple test cases. The first line contains an integer T ($1 \leq T \leq 10^5$) denoting the number of test cases. Each of the following T lines contains a single odd integer a ($1 \leq a \leq 10^9$).

Output

For each test case, print the output on a new line. If there exist integers x and y satisfying (x^2 - $y^2 = a$), print "YES" followed by the values of x and y separated by a space. Otherwise, print "NO" without quotes.

Example

standard input	standard output
1 1	YES 1 0

Problem K. Karnak

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Dark Blue`

One day Abo Taha decided to leave the computer engineering community and be a trader, as he thinks that trading is much more profitable. He sold his laptop and bought a plane ticket to Egypt, hoping to find some valuable artifacts and souvenirs to sell in the global market. He had always been fascinated by the ancient Egyptian civilization, and he wanted to see it for himself.

In the ancient ruins of Karnak City near Luxor, Abo Taha was amazed. The magnificent Karnak Temple Complex, stood before him. The grand temples and statues showcased the brilliance of ancient Egyptian architecture. As he explored the sacred site, Abo Taha imagined the elaborate religious ceremonies that once made Karnak the spiritual heart of Egypt. The whispers of history enveloped him, urging him to uncover the secrets of this timeless place.

He decided to be trading in PCs so he thought it would be a good idea to check out the market prices but he was surprised that the price of the same pieces varies a lot between different traders, as an engineer he does not believe anything else more than numbers so he decided to calculate the difference between the highest price and the lowest price in the market, he has already accumulated the prices and it is only left to calculate the difference, the number of prices he counted is a lot and calculating the difference manually is a very bad and tedious thing to do, however, Abo Taha has sworn an oath not to write a code anymore, so he asks you to do him this favor. he will give you the list of prices and wants you to write a program to calculate this difference for him.

Input

The first line of the input will be an integer n, where ($1 \leq n \leq 10^5$), representing the number of prices Abo Taha has accumulated. The second line contains array A of n integers ($1 \leq A_i \leq 10^9$) representing the prices.

Output

output one integer representing the answer for the problem.

Example

standard input	standard output
4 1 7 2 5	6

Problem L. Luxor

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Bronze`

Luxor, the "Hundred Gates City,"boasts the iconic Luxor Temple at its heart. Dedicated to the Theban triad of Amun, Mut, and Khonsu, this ancient masterpiece showcases grand statues, towering obelisks, and intricate hieroglyphics. A living relic of human civilization, the temple exudes an ethereal charm, especially when illuminated by the setting sun.

Every year, the Madbouly family plays an amazing game during their visit to Luxor. In this game, they choose someone and give them a smoothie collection.

smoothly collection is a collection of arrays ,where each array consist of some elements , and each element has at least one element (in the same array) greater than or equal to its half(in other world each element x will appear in the array if there is at least one element y such that $x \leq 2 * y$ or $y \geq 0.5 * x$) of course the smallest element in the array is excluded from this rule. and there is another constrain in the whole collection : for all elements x in any array, all elements y such that $y \leq 2 * x$ must be located in this array ,y couldn't be appear in any other arrays .

the major task in the game is to find the **Madboul Number**,which is equal to the sum of the following:for each array in out smoothly collection we need to calculate the **magic number** witch is equal to= Σp^s, where p is a prime number that could divide the multiplication of all numbers in the array, s is any number from 1 to m such that p^m still could divide the multiplication of all numbers in the array. and the **Madboul Number** is the summation of all **magic numbers** over all the arrays in our collection.

But unfortunately the smoothly collection was lost this year,but still we have one array A that hold all elements in all arrays in the smoothly collection.

You will get this array , your task is to find the smoothly collection then calculate the **Madboul Number** and out this number.

Input

the first line contains a single integer $n(1 \leq n \leq 10^5)$,the number of elements in the array A.

Then n integers separated by a space follow representing the elements of the array $A(2 \leq A_i \leq 10^3)$.

Output

output an integer represents the **Madboul Number** modulo $1000000007(10^9 + 7)$.

Examples

standard input	standard output
10 2 3 4 5 12 13 14 15 103 618	284
5 2 4 8 16 32	65534
3 2 5 11	18

Problem M. Memphis

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Pink`

Nadia and Omar were archaeologists who specialized in ancient Egypt. They had always been fascinated by the history and culture of Memphis, the first capital of Egypt. They had read about its grandeur and glory, and how it had been the center of power and civilization for many centuries.

They had also read about its decline and disappearance, and how it had been buried under the sand and forgotten. They wanted to find out more about Memphis and its secrets, and they hoped to discover some of its monuments and artifacts. One day, they received an invitation to join an excavation team that had located a possible site of Memphis.

They accepted the invitation and traveled to the site. There, they found a complex set of circular rooms, each room with n-1 doors that are connected to all other rooms. There were n rooms in total, and some of the doors were opened, while others were closed. Nadia and Omar wondered what the purpose of these rooms was, and what they could reveal about Memphis. They decided to explore the rooms and try to find out their secrets. and they need your help!

For each room i, you will be given a set of intervals $[a, b]$ and their associated costs c. This indicates that the door between room i and any room in the range from a to b is opened, and you can pass through it with a cost of c.

Note: Since rooms are circular if there is a range $[a, b]$ with a $>$ b this simply means all rooms $a, a+1, ..., n, ..., b-1, b$

You are given a start room S and an end room E. Your task is to calculate the minimum cost required to travel from the start room S to the end room E.

Input

The input consists of the following elements:

- The first line contains one integer n $(1 \leq n \leq 10^5)$ number of rooms.
- For each room i:
  - You will be given one integer m_i $(0 \leq m_i \leq 10^5)$ the number of intervals for the ith room.
  - Then m_i lines follow. Each of them contains three integers a_{ij}, b_{ij}, c_{ij}, such that $[a_{ij}, b_{ij}]$ is the range for the room i and the interval j, c_{ij} is the associated cost.

  Note that the room is circular meaning if a_{ij} is greater that b_{ij}, then you can go to all rooms with indexes $a_{ij}, ..., n, 1, ...b_{ij}$. $(1 \leq a_{ij}, b_{ij} \leq n)$ $(1 \leq c_{ij} \leq 100)$
- The last line contains two integers S is start room and E is the end room $(1 \leq S, E \leq n)$.

It's guaranteed that total number of all intervals for all nodes never exceeds 10^5

Output

You should output a single value representing the minimum cost required to travel from the start room S to the end room E. If no path exists just output -1

Examples

standard input	standard output
4 1 2 3 3 0 2 1 2 1 4 4 1 0 1 4	4
2 0 1 1 1 2 1 2	-1

Note

In the first testcase you can go from room 1 to room 3 with cost 3 then go to room 4 with cost 1 then total cost is 4

In the second testcase there is no way to go from room 1 to room 2

Problem N. Nefertiti

Input file:	`standard input`
Output file:	`standard output`
Balloon Color:	`Light Green`

Enthralled by Nefertiti, an ancient Egyptian queen, Soka found inspiration in her influential role during the Amarna Period. As King Akhenaten's principal wife, she played a powerful role in state affairs and became one of ancient Egypt's most visible queens. Her captivating bust, unearthed in 1912, stands as a timeless masterpiece of ancient Egyptian art. However, many aspects of Nefertiti's later life and fate continue to intrigue historians and scholars.

Soka has an array A of length N is called **Balanced** if you can slice the array such that every sliced segment has M prime numbers.

For example, if $m = 1$ and $A = [2, 4, 3]$, We have two prime numbers 2 and 3, You can slice the array using one slice to make $A = [2 \mid 4, 3]$, hence the first sliced array [2] has one prime number and the second sliced array [4, 3] has one prime number, thus the array is **Balanced** or $A = [2, 4 \mid 3]$, thus the answer is **two balanced arrays**.

How many different ways to slice the array such that the array is still **Balanced**, The answer could be quite large, so it should be printed modulo $(10^9 + 7)$.

Prime numbers are numbers greater than 1 that only have two factors, 1 and the number itself.

Input

The first line contains two integers N and M $(1 \leq M \leq N \leq 10^6)$.

The second line contains array A of N integers $(1 \leq A_i \leq 10^7)$.

Output

The answer of the problem modulo $10^9 + 7$.

Example

standard input	standard output
3 1 2 4 3	2