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.

Mohamed, a determined archaeologist, and Moamen, 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.

Moamen gave Mohamed an array A with N element and he asked him to make all element equal to 1. he can do only two operation any number of time:

- decrease A_i by one (cost this operation equal 1).
- Divide A_i by any divisor A_i has (cost this operation equal this divisor).

Can you help Mohamed to get minimum number of costs to make all element equal to 1?

Input

The first line contains one integer T ($1 \leq T \leq 10^3$) — the number of test cases.

Each test case consists of two lines:

- the first line contains one integer N ($1 \leq N \leq 10^6$).
- the second line contains array A of N integers ($1 \leq A_i \leq 10^6$).

It is guaranteed that the sum of N across all test cases does not exceed 10^6. .

Output

For each test case print minimum number of costs to make all element equal to 1.

Example

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

CamScanner

Problem B. Bolbitine

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

In the year 1799, an intriguing stone slab, laden with three unique scripts, surfaced near the town of Bolbitine. An enigma etched in stone, it bore the key to unlocking ancient Egyptian hieroglyphs - the Rosetta Stone. Today, the original stone resides in the British Museum, while a replica stands in its discovery place, the town of Bolbitine, also known as Rosetta or Rashid.

On Rosetta stone, Hany found N gold coin each coin has A_i weight, he hates coin that has heavy weight so he want to minimize weight gold coin by only this operation at most K times.

- take any piece of gold coin and divide it into two new pieces of gold that their sum exactly equal to the old gold coin.

For example if the gold piece weight was 10 we can divide it to divide it into two new pieces of size 7 and 3 or 2 and 8 and so on.

Your task is to minimize the maximum weight of pieces of gold coins after do at most K operations.

Input

The first line contains one integer T ($1 \leq T \leq 10^3$) — the number of test cases.

Each test case consists of two lines:

- the first line contains two integers N, K ($1 \leq N \leq 10^6$), ($1 \leq K \leq 10^9$).
- the second line contains N element ($1 \leq A_i \leq 10^9$).

It is guaranteed that the sum of N across all test cases does not exceed 10^6.

Output

Print weight of the gold that has the maximum size after do at most K operations.

Example

standard input	standard output
1 4 4 2 4 8 2	2

CamScanner

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 have N rocks, the i_{th} rock is located on X-axis in A_i, he can jump between two rocks if and only if the distance between them less than or equal to D.

You will be asked Q questions, each one contains two integers x and y, if he can move from x_{th} rock to y_{th} rock or not, if he can print "YES", otherwise print "NO".

Input

The first line contains one integer T $(1 \leq T \leq 10^3)$ — the number of test cases.

Each test case consists of three lines:

- the first line contains two integers N, D $(1 \leq N \leq 10^6)$, $(1 \leq D \leq 10^9)$.
- the second line contains array A of N integers $(1 \leq A_i \leq 10^9)$.
- the third line contains one integer Q $(1 \leq Q \leq 10^6)$, the number of questions. Then Q lines follow. Each question contains two numbers x, y $(1 \leq x, y \leq N)$.

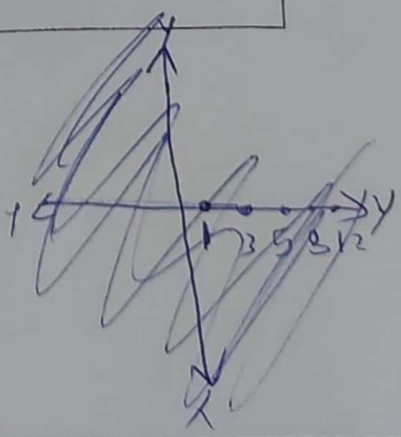
It is guaranteed that the sum of N, Q across all test cases does not exceed 10^6.

Output

For each questions print "YES" if he can move from x_{th} rock to y_{th} rock otherwise print "NO".

Example

standard input	standard output
1 5 3 1 3 8 5 12 3 1 2 1 3 2 5	YES YES NO



Problem D. Djoser (Zoser)

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

In the ancient land of Egypt, during the 27th century BCE, a mighty king named Djoser reigned. His name echoed across time, for he embarked on a remarkable endeavor—the construction of a groundbreaking step pyramid at Saqqara. With the ingenious architect Imhotep at his side, Djoser's pyramid rose, a marvel of its age. This grand monument, the earliest large-scale stone structure, heralded a new era in Egyptian funerary architecture, captivating the imagination of those who seek the mysteries of ancient Egypt, including young archaeology enthusiast Men3m.

Men3m was walking with his daughter near Djoser's pyramid when she saw a toy store. She asked her father to enter the store and buy something.

Men3m knows that she wants to buy her favorite toy. So he will enter and leave her take what she wants. Firstly, his daughter will choose the toy size lets say A (toy size), then she will decide how many toys she wants to buy lets say C (the quantity of her favorite toy), and because of the shop owner knows $Men3m$ he decided to give Men3m a discount for each toy price separately B (the discount Men3m will take) assume toy price is X so toy price will be $(X \bmod B)$.

Men3m was upset because his daughter will buy the same toy C times so he asked the owner if he has different sizes of the chosen toy and the owner told him yes I have. Men3m wants all the sizes to be scaled up from the chosen toy so Men3m will buy the first C scaled up toy of A.

A size
B Discount
C times

Note: The price of each toy is the size of that toy.

Example :

- if Men3m's daughter chose toy of size 3 and she need 4 toys and the discount for each toy was 7 L.E
- Men3m will take toys with sizes 3, 6, 9, 12 and men3m will take the discount for the last two toys so he will pay $3 + 6 + 2 + 5 = 16$ L.E

Can you tell men3m how much he has to pay for all toys?

Input

The first line contains one integer T $(1 \leq T \leq 10^5)$ — the number of test cases.

- for each testcase line has three numbers A, B, C $(1 \leq A, B, C \leq 10^6)$ - the toy size, the discount for each toy, the quantity he will buy for his daughter.

Output

For each testcase print how much Men3m has to pay for all toys?

Example

standard input	standard output
2 1 4 5 2 7 2	7 6

CamScanner

Problem E. Edfu

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

In a cozy café, friends Alaa and Mohamed chatted excitedly about their love for ancient Egypt. Alaa talked about Edfu, a city known for its big, well-preserved temple. He described how the temple was made from huge blocks of stone, set out like a giant map of the sky. Mohamed listened, wide-eyed, particularly taken by the idea of an ancient tool used to measure the Nile's water during the flood season. Together, they dreamed of traveling to Egypt to see these wonders with their own eyes.

During their travel, Alaa gives Mohamed a positive integer N, he challenges him to construct a new number (without leading zeros), that is a multiple of 11, by inserting exactly one digit $(0 \ldots 9)$ anywhere in the given number N. It is guaranteed that N does not have any leading zeros.

Alaa prefers smaller numbers, he wants to construct the smallest such number possible. Can you help Mohamed?

Input

The first line contains one integer T $(1 \leq T \leq 10)$ — the number of test cases.

- One line contains an integer N $(1 \leq N \leq 10^{100000})$.

Output

For each test case, output one line containing the new number.

Example

standard input	standard output
2 1244 11	12144 110

CamScanner

Problem F. Fayoum

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

In the western desert of Egypt, lies the ancient city of Fayoum, where history spans not only thousands of years but millions. A city that is filled with countless natural and historical wonders such as Lake Qarun and Wadi Al-Rayyan. Of all the interesting archaeological sites, Men3m found Wadi Al Hitan to be the most extraordinary site that reveals a rich fossil record of ancient marine life from the Eocene epoch. Among its wonders are fossilized whale skeletons and bones, revealing precious insights into the ancient ancestors of today's magnificent whales.

After visiting Wadi Al-Rayyan, Men3m was deploying his graduation project and felt tired so he decided to take a rest and play a game so he find one of his friends Fahmy and asked him to play a chess but Fahmy wants to play lol so they decided to toss a coin N times men3m always will choose head and Fahmy will choose tail after finishing playing the toss they forget some of the results was head or tail these result was named as heil so they decided to start dividing all the hail between them and men3m will take the first hail (if it exists) and then Fahmy will take his turn.

The winner who collects more than the other, and the winner will choose what game to play.

Input

The first line contains one integer T ($1 \leq T \leq 10^3$) — the number of test cases.

Each test case consists of two lines:

- the first line contains an integer N ($1 \leq N \leq 10^6$).
- the second line contains array A of N integers ($-1 \leq A_i \leq 1$), indicates what the player gets after playing the toss -1 if it was tail, 1 if it was head and 0 if it was heil.

It is guaranteed that the sum of N across all test cases does not exceed 10^6.

Output

For each test case, output "Chess" if Men3m wins, and "Lol" if Fahmy wins otherwise print "Go deploying" without double quotes.

Example

standard input	standard output
3 5 0 -1 0 1 0 3 0 -1 0 2 -1 1	Chess Lol Go deploying

CamScanner

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.

Near Khufu, Mohamed found a string S of length N and he loved beautiful strings.

Beautiful string is a string that has any character repeated strictly greater than $N/2$ (N size of current string).

You can do only one operation that:

- insert any character in S.

Can you help Mohamed to make S beautiful by minimum number of operations?

Input

The first line contains one integer T ($1 \leq T \leq 10^3$) — the number of test cases.

Each test case consists of two lines:

- the first line contains an integer N ($1 \leq N \leq 10^6$).
- the second line contains string S that has only lower-case letter.

It is guaranteed that the sum of N across all test cases does not exceed 10^6.

Output

For each test case print minimum number of operations to make S beautiful.

Example

standard input	standard output
3 3 abc 4 aaab 5 abcde	2 0 4

Note

First test case string can be "aaabc".

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.

Mohamed lives in Cairo, near the ruins of Heliopolis. He has three children, and he is weak in math. Every day he confuses how to split money between them equally, so he wants your help to make sure that his money can be divided fairly. You have to tell him "YES"if he can do it, otherwise "NO".

You also want to help him improve his math skills, so you can teach him some tricks and tips that you learned from Heliopolis. Maybe he will also develop an interest in the stars and the sun, like the ancient Egyptians did.

Input

The first line contains one integer T ($1 \leq T \leq 10^5$) — the number of test cases.

Each test case consists of one line:

- the line contains an integer N ($1 \leq N \leq 10^6$) N is the amount of money.

Output

For each testcase Print "YES"if he can otherwise "NO".

Example

standard input	standard output
4 3 7 6 5	YES NO YES NO

CamScanner

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.

Imhotep had an array A with N elements. He wanted to make all elements equal by performing the following operation any number of times (maybe the same i):

- Choose any two indices i $(1 \leq i \leq N)$,$j(1 \leq j \leq |X|)$ and set $A_i = (A_i \oplus X_j)$.

X is a set obtained from an array B by choosing some elements from B and computing their bitwise XOR.

Imhotep wanted to make array A equal by minimum number of elements in the set X. Can you solve this problem?

Note: $\oplus$ denotes the bitwise XOR operation

Input

The first line contains one integer T $(1 \leq T \leq 10)$ — the number of test cases.

Each test case consists of Three lines:

- the first line contains two integers N,M $(1 \leq N, M \leq 10^5)$.
- the second line contains array A of N integers$(1 \leq A_i \leq 10^3)$.
- the third line contains array B of M integers$(1 \leq B_i \leq 10^9)$.

It is guaranteed that the sum of N across all test cases does not exceed 10^5.

It is guaranteed that the sum of M across all test cases does not exceed 10^5.

Output

For each testcase print minimum number of elements in the set X to make A equal or -1 if impossible to do that.

Example

standard input	standard output
3 2 3 5 5 1 2 7 2 1 2 3 10 2 2 2 3 6 7	0 -1 1

CamScanner

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.

Mohamed found an array A of N jewels, each labeled by a number. Abdo, Mohamed's friend, will give him some queries.

Each query has four numbers L, R, X, Z. Abdo wants to know if from L to R there is a number with frequency X, another number with frequency $X+1$ ... and another number has frequency Z. If so, Mohamed will tell Abdo "YES". Otherwise he will say "NO".

Can you help Mohamed to answer Abdo's queries?

Input

First line contains an integer N ($1 \leq N \leq 10^5$).

Second line contains array A of N integers ($1 \leq A_i \leq 10^6$).

Third line contains an integer Q ($1 \leq Q \leq 10^5$).

Then Q lines follow. Each of them contains four integers L, R, X, Z ($1 \leq L \leq R \leq N, 1 \leq X \leq Z \leq N$).

Output

For each query print "YES" if Mohamed found his answer otherwise "NO".

Example

standard input	standard output
8 5 1 2 2 3 3 3 6 3 2 7 1 3 1 2 2 2 1 8 1 4	YES NO NO

CamScanner

Problem K. Karnak

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

In the ancient ruins of Karnak City near Luxor, Adel 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, Adel 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 noticed some strange symbols on the walls, resembling numbers and letters. He wondered what they meant and how they related to the ancient culture. He decided to ask his friend Mohamed, who was good at math and cryptography. He sent him Q queries, each with three numbers l, r, X. He asked Mohamed to answer each query by finding the number of X_{prime} from l to r. He hoped that Mohamed could help him decipher the mysterious code and reveal more about Karnak's hidden mysteries.

Number N is called X_{prime} if the number of factors in its decomposition into prime numbers is equal to X.

Can you help Mohamed for answer these queries?

Input

The first line contains one integer Q ($1 \leq Q \leq 10^5$) — the number of queries.

Each query consists of one line contains three integers: l, r, X ($1 \leq l \leq r \leq 10^5$), ($1 \leq X \leq 16$).

Output

For each query print number of X_{prime} from l to r.

Example

standard input	standard output
3 2 7 1 1 10 2 12 12 3	4 4 1

CamScanner

Problem L. Luxor

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

Ibrahim loves mathematics, but he hates even numbers, so he asks his friend Alaa to help him solve this problem. He gave Alaa a range of integer numbers from L to R, and asked him to delete any number in the range such that the sum of digits of that number is even. Alaa agreed to help him, but only if Ibrahim would join him on a trip to Luxor, the "Hundred Gates City". Alaa wanted to see the iconic Luxor Temple at its heart, dedicated to the Theban triad of Amun, Mut, and Khonsu. He was fascinated by the ancient masterpiece that showcased grand statues, towering obelisks, and intricate hieroglyphics. He thought that the temple was a living relic of human civilization, and that it exuded an ethereal charm, especially when illuminated by the setting sun. Ibrahim agreed to go with him, hoping that Alaa would keep his promise and help him with his math problem. He also secretly wanted to see the temple for himself, and maybe learn something new about the ancient culture.

Output the number of numbers that Alaa won't delete from the range.

Input

The first line contains one integer T ($1 \leq T \leq 10^5$) — the number of test cases.

Each test case consists of one line contains two integers L, R ($1 \leq L \leq R \leq 10^9$).

Output

For each testcase print the number of numbers that Alaa won't delete from the range.

Example

standard input	standard output
3 10 20 21 21 11 11	5 1 0

CamScanner

Problem M. Memphis

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

Mohamed and Fahmy are having a party and they have an infinite number of friends numbered from 1 to infinity, but unfortunately, they can't invite all their friends because the house can only take a certain amount of people. They decided to make their party more fun and interesting by having an ancient Egyptian theme. They wanted to celebrate the history and culture of Memphis, the first capital of the unified country, founded around 3100 BC by King Menes. They learned that this influential city witnessed the rise and fall of many dynasties and kings, flourishing as a cultural and artistic hub. Grand monuments, temples, and statues adorned its landscape. However, Memphis's significance waned with the ascent of Thebes and Alexandria, eventually leading to its abandonment and burial under the sand. Mohamed and Fahmy hoped that their party would honor the legacy of Memphis and its people, and that their friends would enjoy the historical atmosphere. They also hoped that their house would not end up like Memphis, buried under a pile of sand.

Because Mohamed and Fahmy love all their friends, they decided to choose a random range from L to R from their friends but unfortunately some of their friends must bring some of their relatives with them and that number equals to the number of digits in the friend number.

for example friend "256"will bring 3 relatives and friend "9"will bring 1 relative. They are afraid that the choosen range of friends will exceed the limit of the house so they asked you to calculate the number of people that will come to the party if they chose the range from L to R.

Input

The first line contains one integer T ($1 \leq T \leq 10^3$) — the number of test cases.

Each test case consists of one line contains two integers L, R ($1 \leq L \leq R \leq 10^{17}$).

Output

For each testcase print the number of people that will come to the party if they chose the range from L to R.

Example

standard input	standard output
3 8 11 1 3 1 1	6 3 1

CamScanner