^ & ^

Time Limit: 1000ms Memory Limit: 64M

Description

Bit operation is a common computing method in computer science ,Now we have two positive integers A and B ,Please find a positive integer C that minimize the value of the formula $(A\ xor\ C)\ \&\ (B\ xor\ C)$ .Sometimes we can find a lot of C to do this ,So you need to find the smallest C that meets the criteria .

For example ,Let's say A is equal to 5 and B is equal to 3 ,we can choose C=1,3.... ,so the answer we're looking for C is equal to 1.

Input

The input file contains T test samples.(1<=T<=100)

The first line of input file is an integer T.

Then the T lines contains 2 positive integers, A and B, ($1 \leq A, B < 2^{32}$)

Output

For each test case,you should output the answer and a line for each answer.

Sample Input

1

3 5

Sample Output

1

array

Time Limit: 1500ms Memory Limit: 256M

Description

You are given an array $a_1, a_2, \ldots, a_n (\forall i \in [1, n], 1 \leq a_i \leq n)$. Initially, each element of the array is **unique**.

Moreover, there are m instructions.

Each instruction is in one of the following two formats:

1. $(1, pos)$,indicating to change the value of a_{pos} to $a_{pos} + 10,000,000$;
2. $(2, r, k)$,indicating to ask the minimum value which is **not equal** to any a_i ($1 \leq i \leq r$) and **not less** than k.

Please print all results of the instructions in format 2.

Input

The first line of the input contains an integer $T(1 \leq T \leq 10)$, denoting the number of test cases.

In each test case, there are two integers $n(1 \leq n \leq 100,000)$,$m(1 \leq m \leq 100,000)$ in the first line, denoting the size of array a and the number of instructions.

In the second line, there are n distinct integers $a_1, a_2, \ldots, a_n$ $(\forall i \in [1,n], 1 \leq a_i \leq n)$,denoting the array. For the following m lines, each line is of format $(1,t1)$ or $(2,t2,t3)$. The parameters of each instruction are generated by such way :

For instructions in format 1 , we defined $pos = t1 \oplus LastAns$. (It is promised that $1 \leq pos \leq n$)

For instructions in format 2 , we defined $r = t2 \oplus LastAns, k = t3 \oplus LastAns$. (It is promised that $1 \leq r \leq n, 1 \leq k \leq n$)

(Note that $\oplus$ means the bitwise XOR operator.)

Before the first instruction of each test case, $Lastans$ is equal to 0 .After each instruction in format 2, $LastAns$ will be changed to the result of that instruction.

($\sum n \leq 510,000, \sum m \leq 510,000$)

Output

For each instruction in format 2, output the answer in one line.

Sample Input

3

5 9

4 3 1 2 5

2 1 1

2 2 2

2 6 7

2 1 3

2 6 3

2 0 4

1 5

2 3 7

2 4 3

10 6

1 2 4 6 3 5 9 10 7 8

2 7 2

1 2

2 0 5

2 11 10

1 3

2 3 2

10 10

9 7 5 3 4 10 6 2 1 8

1 10

2 8 9

1 12

2 15 15

1 12

2 1 3

1 9

1 12

2 2 2

1 9

Sample Output

1

5

2

2

5

6

1

6

7

3

11

10

11

4

8

11

[hint] note: After the generation procedure ,the instructions of the first test case are : 2 1 1, in format 2 and r=1 , k=1 2 3 3, in format 2 and r=3 , k=3 2 3 2, in format 2 and r=3 , k=2 2 3 1, in format 2 and r=3 , k=1 2 4 1, in format 2 and r=4 , k=1 2 5 1, in format 2 and r=5 , k=1 1 3 , in format 1 and pos=3 2 5 1, in format 2 and r=5 , k=1 2 5 2, in format 2 and r=5 , k=2

the instructions of the second test case are : 2 7 2, in format 2 and r=7 , k=2 1 5 , in format 1 and pos=5 2 7 2, in format 2 and r=7 , k=2 2 8 9, in format 2 and r=8 , k=9 1 8 , in format 1 and pos=8 2 8 9, in format 2 and r=8 , k=9

the instructions of the third test case are : 1 10 , in format 1 and pos=10 2 8 9 , in format 2 and r=8 , k=9 1 7 , in format 1 and pos=7 2 4 4 , in format 2 and r=4 , k=4 1 8 , in format 1 and pos=8 2 5 7 , in format 2 and r=5 , k=7 1 1 , in format 1 and pos=1 1 4 , in format 1 and pos=4 2 10 10, in format 2 and r=10 , k=10 1 2 , in format 1 and pos=2 [/hint]

K-th occurrence

Time Limit: 5000ms Memory Limit: 512M

Description

You are given a string S consisting of only lowercase english letters and some queries.

For each query (l, r, k), please output the starting position of the k-th occurence of the substring $S_l S_{l+1} \dots S_r$ in S.

Input

The first line contains an integer $T(1 \leq T \leq 20)$, denoting the number of test cases.

The first line of each test case contains two integer $N(1 \leq N \leq 10^5), Q(1 \leq Q \leq 10^5)$, denoting the length of S and the number of queries.

The second line of each test case contains a string $S(|S| = N)$ consisting of only lowercase english letters.

Then Q lines follow, each line contains three integer $l, r(1 \leq l \leq r \leq N)$ and $k(1 \leq k \leq N)$, denoting a query.

There are at most 5 testcases which N is greater than 10^3.

Output

For each query, output the starting position of the k-th occurence of the given substring.

If such position don't exists, output -1 instead.

Sample Input

2

12 6

aaabaabaaaab

3 3 4

2 3 2

7 8 3

3 4 2

1 4 2

8 12 1

1 1

a

1 1 1

Sample Output

5

2

-1

6

9

8

1

path

Time Limit: 1500ms Memory Limit: 64M

Description

You have a directed weighted graph with n vertexes and m edges. The value of a path is the sum of the weight of the edges you passed. Note that you can pass any edge any times and every time you pass it you will gain the weight.

Now there are q queries that you need to answer. Each of the queries is about the k-th minimum value of all the paths.

Input

The input consists of multiple test cases, starting with an integer t $(1 \leq t \leq 100)$, denoting the number of the test cases. The first line of each test case contains three positive integers n,m,q. $(1 \leq n, m, q \leq 5 * 10^4)$

Each of the next m lines contains three integers u_i, v_i, w_i, indicating that the $i-th$ edge is from u_i to v_i and weighted w_i.$(1 \leq u_i, v_i \leq n, 1 \leq w_i \leq 10^9)$

Each of the next q lines contains one integer k as mentioned above.$(1 \leq k \leq 5 * 10^4)$

It's guaranteed that Σn ,Σm, Σq, $\Sigma \max(k) \leq 2.5 * 10^5$ and $\max(k)$ won't exceed the number of paths in the graph.

Output

For each query, print one integer indicates the answer in line.

Sample Input

1

2 2 2

1 2 1

2 1 2

3

4

Sample Output

3

3 [hint] 1->2 value :1

2->1 value: 2

1-> 2-> 1 value: 3

2-> 1-> 2 value: 3

[/hint]

huntian oy

Time Limit: 1500ms Memory Limit: 64M

Description

One day, Master oy created a new function to celebrate his becoming a 'huntian' in majsoul.

$f(n,a,b) = \sum_{i=1}^{n} \sum_{j=1}^{i} gcd(i^a - j^a, i^b - j^b)[gcd(i,j) = 1]\%(10^9 + 7)$

Given n, a and b, Master oy wanted Newbie jj who was still a 'chuxin' to answer the value of $f(n,a,b)$.

Input

There are multiple test cases.

The first line contains an integer T, indicating the number of test cases.

For each test case, there are three positive integers n, a and b which are separated by spaces. It's guaranteed that a and b are coprime.

$1 \leq n,a,b \leq 10^9$

$T = 10^4$, but there are only 10 test cases that n is over 10^6.

Output

For each test case, an integer in one line representing your answer.

Sample Input

2

1 2 3

100 2 3

Sample Output

0

101542

Shuffle Card

Time Limit: 1000ms Memory Limit: 64M

Description

A deck of card consists of n cards. Each card is different, numbered from 1 to n. At first, the cards were ordered from 1 to n. We complete the shuffle process in the following way, In each operation, we will draw a card and put it in the position of the first card, and repeat this operation for m times.

Please output the order of cards after m operations.

Input

The first line of input contains two positive integers n and m. (1<=n, m<=10^5)

The second line of the input file has n Numbers, a sequence of 1 through n.

Next there are m rows, each of which has a positive integer s_i, representing the card number extracted by the i-th operation.

Output

Please output the order of cards after m operations. (There should be one space after each number.)

Sample Input

5 3

1 2 3 4 5

3

4

3

Sample Output

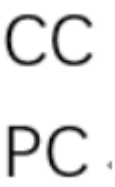
3 4 1 2 5

Windows Of CCPC

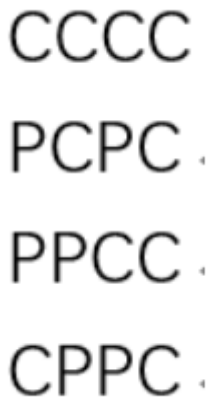
Time Limit: 1000ms Memory Limit: 64M

Description

In recent years, CCPC has developed rapidly and gained a large number of competitors .One contestant designed a design called CCPC Windows .The 1-st order CCPC window is shown in the figure:



And the 2-nd order CCPC window is shown in the figure:



We can easily find that the window of CCPC of order k is generated by taking the window of CCPC of order $k-1$ as C of order k, and the result of inverting C/P in the window of CCPC of order $k-1$ as P of order k. And now I have an order k ,please output k-order CCPC Windows , The CCPC window of order k is a $2^k * 2^k$ matrix.

Input

The input file contains T test samples.(1<=T<=10)

The first line of input file is an integer T.

Then the T lines contains a positive integers k , ($1 \leq k \leq 10$)

Output

For each test case,you should output the answer .

Sample Input

3

1

2

3

Sample Output

CC

PC

CCCC

PCPC

PPCC

CPPC

CCCCCCCC

PCPCPCPC

PPCCPPCC

CPPCCPPC

PPPPCCCC

CPCPPCPC

CCPPPPCC

PCCPCPPC

Fishing Master

Time Limit: 1000ms Memory Limit: 64M

Description

Heard that eom is a fishing MASTER, you want to acknowledge him as your mentor. As everybody knows, if you want to be a MASTER's apprentice, you should pass the trial. So when you find fishing MASTER eom, the trial is as follow:

There are n fish in the pool. For the i - th fish, it takes at least t_i minutes to stew(overcook is acceptable). To simplify this problem, the time spent catching a fish is k minutes. You can catch fish one at a time and because there is only one pot, only one fish can be stewed in the pot at a time. While you are catching a fish, you can not put a raw fish you have caught into the pot, that means if you begin to catch a fish, you can't stop until after k minutes; when you are not catching fish, you can take a cooked fish (stewed for no less than t_i) out of the pot or put a raw fish into the pot, these two operations take no time. Note that if the fish stewed in the pot is not stewed for enough time, you cannot take it out, but you can go to catch another fish or just wait for a while doing nothing until it is sufficiently stewed.

Now eom wants you to catch and stew all the fish as soon as possible (you definitely know that a fish can be eaten only after sufficiently stewed), so that he can have a satisfying meal. If you can complete that in the shortest possible time, eom will accept you as his apprentice and say "I am done! I am full!". If you can't, eom will not accept you and say "You are done! You are fool!".

So what's the shortest time to pass the trial if you arrange the time optimally?

Input

The first line of input consists of a single integer $T(1 \leq T \leq 20)$, denoting the number of test cases.

For each test case, the first line contains two integers $n(1 \leq n \leq 10^5)$, $k(1 \leq k \leq 10^9)$, denoting the number of fish in the pool and the time needed to catch a fish.

the second line contains n integers, $t_1, t_2, \ldots, t_n(1 \leq t_i \leq 10^9)$,denoting the least time needed to cook the i - th fish.

Output

For each test case, print a single integer in one line, denoting the shortest time to pass the trial.

Sample Input

2

3 5

5 5 8

2 4

3 3

Sample Output

23

11

[hint] Case 1: Catch the 3rd fish (5 mins), put the 3rd fish in, catch the 1st fish (5 mins), wait (3 mins),

take the 3rd fish out, put the 1st fish in, catch the 2nd fish(5 mins),

take the 1st fish out, put the 2nd fish in, wait (5 mins), take the 2nd fish out.

Case 2: Catch the 1st fish (4 mins), put the 1st fish in, catch the 2nd fish (4 mins),

take the 1st fish out, put the 2nd fish in, wait (3 mins), take the 2nd fish out. [/hint]

Kaguya

Time Limit: 1500ms Memory Limit: 64M

Description

One day, the student council secretary Fujiwara Chika asked a question from Shinomiya Kaguya: there are n nodes on the left side of a bipartite graph and m nodes on the right side. The probability of 0.5 between any two nodes on different sides has a two-way edge. She wants to know what is the expected distance between a left node and a right node? (The distance between two nodes is the minimum number of edges that must pass. If the two nodes are not connected, their distance is regarded as 0.) It is well known that Shinomiya Kaguya is an IT rookie, and this is why Shinomiya Kaguya is stumped. Seeing that Fujiwara Chika is about to win, Shinomiya Kaguya, who is cute and arrogant, asks for help. Can you help Miss Kaguya to win?

Input

The input contains a $T(T \leq 30)$ to indicate the number of case, followed by T rows, three numbers per line representing
$n(1 \leq n \leq 30), m(1 \leq m \leq 30), P(772,001 \leq P \leq 1,000,000,007)$ indicating that there are n nodes on the left side, m nodes on the right side, and P is a **prime** number.

Output

The output has a total of T lines, and one answer per line indicates the desired distance between a pair of nodes(one left node and one right node). It can be shown that it can be represented as $\frac{A}{B}$ where A and B are coprime integers and B≠0(mod P). Print the value of $A * B^{-1}$(mod P).

Sample Input

2

2 2 772001

2 2 1000000007

Sample Output

241251

187500002

Touma Kazusa's function

Time Limit: 8000ms Memory Limit: 128M

Description

$ToumaKazusa$ is dating with $KitaharaHaruki$. To test if $Haruki$ is a skilled man, $Kazusa$ created a function which called $Kazusa\ function$. Its expression is as follows:

$S(l,r)=\sum_{i=l}^{r}\sum_{j=l}^{r}\varphi(gcd(a_i,a_j))lcm(a_i,a_j)$ .l and r are the left and right endpoints of an interval of sequence a, respectively.

However, because this function is really easy for $Haruki$ and $Haruki$ told $Kazusa$ the answer quickly. So $Kazusa$ strengthened the problem.

Now, $Kazusa$ will gives $Haruki$ a sequence a and q intervals, and for each interval, $Haruki$ should calculate $S(l,r)$.$Haruki$ still thinks it's easy for him, but he just want to date with $Kazusa$, So this problem should solved by you.

Because the value of $S(l,r)$ maybe too large, you only need output $S(l,r)\ mod\ 2^{32}$

Input

There are multiple test cases. The first line of the input contain an integer $T(1\le T\le 100)$, indicating the number of test cases. For each test case:

First line contains two positive integers $n(1\le n\le 1e5)$ and $q(1\le q\le 1e5)$ which are separated by spaces, denoting the length of sequence a and the number of interval.

Second line contains n positive integers a_1,a_2,a_3,...,$a_n(1\le a_i\le 1e7)$.

Following q lines, each line contain two integers $l,r.(1\le l\le r\le n)$

It is guaranteed that $\sum_n\le 3e5$ and at most two cases $n=1e5$. When $n=1e5$, I guarantee that all a_i are generated randomly.

Output

Output q lines, each line is an integer, representing the value of $S(l,r)\ mod\ 2^{32}$.

Sample Input

1

5 1

1 2 3 4 5

1 5

Sample Output

199

sakura

Time Limit: 2000ms Memory Limit: 256M

Description

There is an infinite 3D value grid space $a_{i,j,k}$. Initially, for $\forall i,j,k\ a_{i,j,k}$ = 1. First, we change the value of M grids. In the $i-th$ operation, we change the value of $a_{x_i,y_i,n}$ from 1 to v_i. Then the grid in the space will change every second. The value of the grid $a_{i,j,k}$ will change to $a^{t1}_{i+1,j+p,k} \times a^{t2}_{i+1,j,k+q} \times a_{i+1,j,k} \times a_{i,j,k}$ for every second. We want to know $a_{0,0,0} mod\ 998244353$ after n seconds.

Input

There are several test cases in the input file. In the each test case, the first line contains five integers $t1,t2,p,q,N(1 \le t1,t2,p,q,N \le 10^9)$. The second line contains one integer M $(1 \le M \le 10^5)$ The $i-th$ line in the next M lines contains three integers $x_i,y_i,v_i(0 \le x_i,y_i \le 10^9,\ 1 \le v_i \le 10^9)$ It is guaranteed that $\sum M \le 2*10^5$ and for $\forall i,j(\ i \ne j);\ x_i \ne x_j\ or\ y_i \ne y_j$ in each test case.

Output

For each test case, print a single line containing an integer, denoting the value of $a_{0,0,0}\ mod\ 998244353$ after n seconds.

Sample Input

1 1 1 1 2 6

0 0 2

0 1 3

0 2 4

1 0 4

1 1 2

2 0 2

Sample Output

9216