

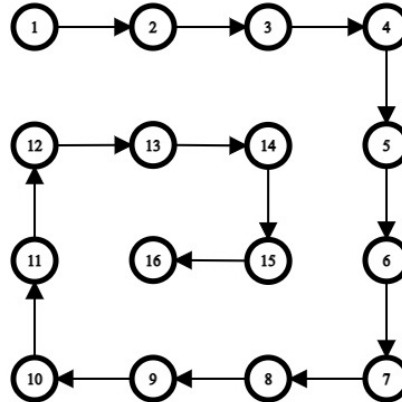
INCEPTION 5.1

A. End Cell

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

Alice is printing a Matrix of size $N * M$ in a spiral form.

The below image shows the spiral matrix traversal.



Alice wants to know which cell of the matrix will be printed at last.

NOTE: Indices are 0-index based.

Input

The input consists of multiple test cases. The first line contains an integer t ($1 \leq t \leq 10^5$) — the number of test cases. The description of the test cases follows.

The first and only line of each test case contains two integers N ($1 \leq N \leq 10^{18}$), M ($1 \leq M \leq 10^{18}$)

Output

For each test case, Print two integers(X, Y) denoting the last visited cell, where ($0 \leq X < N$ and $0 \leq Y < M$).

Example

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

B. Michael and sales

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

Electronic media has taken over the sale of papers. As a result sales department at Dunder Mifflin is not doing well. Corporate has asked Michael to submit a report regarding that.

Michael has N numbers where S_i denotes the paper sale in i^{th} month.

WENUS(Weekly Estimated Net Usage Statistics) of i^{th} month is defined as the maximum summation possible of sales (S_i) of total months upto ten until i^{th} month i.e maximum summation possible of **not more than 10 months** from 1 to i .

He has to send reports for T Dunder Mifflin branches. In report of each branch he has to submit WENUS of each of N months.

Input

The first line of input will contain T ($1 \leq T \leq 10$) (total number of branches).

Data of each branch will be in two lines.

First line will contain N (number of months)($1 \leq N \leq 10^5$).

Second line will contain N integers where i^{th} integer is S_i ($-10^9 \leq S_i \leq 10^9$).

Output

Answer of each testcase will have N space seperated integers denoting the WENUS of each month.

Print report of each branch in new line.

Example

2	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	630	635	640	645	650	655	660	665	670	675	680	685	690	695	700	705	710	715	720	725	730	735	740	745	750	755	760	765	770	775	780	785	790	795	800	805	810	815	820	825	830	835	840	845	850	855	860	865	870	875	880	885	890	895	900	905	910	915	920	925	930	935	940	945	950	955	960	965	970	975	980	985	990	995	1000
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input	Copy
4 3 2 1 3 5 5 1 2 3 3 8 -1 -2 3 4 5 6 7 8 12 5 2 3 4 1 7 10 2 4 11 3 8	
output	Copy
2 3 6 5 6 8 11 14 0 0 3 7 12 18 25 33 5 7 10 14 15 22 32 34 38 49 51 57	

C. Conflict in Dungeon

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

Once upon a time there were three bestfriends named Ishan, Jeet and Krunal who used to live in a dungeon. Once they faced a conflict as Ishan and Krunal liked a same girl named Kitty. Jeet suggested to solve it like adults by organizing a game(Because if they let the girl decide then Ishan won't have a chance :)).

This game consist of n rounds where in each round Ishan and Krunal will choose one number each. Let Ishan's number be u and Krunal's number be v . If absolute of the difference of u and v is divisible by 3 then Ishan wins the round, if absolute of the difference is divisible by 5 then Krunal wins the round, in any other case or if absolute of the difference is divisible by both 3 and 5 then it will result into draw(i.e Jeet should ask her out instead).

As both of them are bad at maths they will preselect one array each and they are going to show numbers of that array cyclically for n rounds.

Lets say A is Ishan's array of x elements then Ishan's moves for n rounds will be: $A_1, A_2, \dots, A_x, A_1, A_2, \dots$ and so on until total number of integers shown by Ishan be n . Similarly Krunal will have an array B of y elements and he will use that cyclically: $B_1, B_2, \dots, B_y, B_1, B_2, \dots$ and so on until total number of integers shown by Krunal be n .

You have to answer for T testcases.

Input

First line of input will contain T (number of testcases) ($1 \leq T \leq 10$).

First line of each testcase will contain n (total number of rounds)($1 \leq n \leq 10^5$).

Second line of each testcase will contain x and y (number of elements Ishan and Krunal have respectively)($1 \leq x, y \leq 10^5$).

Third line of testcase will contain x integers of Ishan's array A ($1 \leq A_i \leq 10^9$).

Fourth line of testcase will contain y integers of Krunal's array B ($1 \leq B_i \leq 10^9$).

Output

Print answer of each testcase in new line.

Output absolute of diiference of number of rounds won by Ishan and Krunal.

Example

input	Copy
3 5 2 3 1 2 4 2 1 7 1 1 2 7 10 4 5 1 2 3 4 4 5 6 7 8	
output	Copy
1 7 6	

Note

For first testcase:

Number showed by Ishan in 5 rounds: 1, 2, 1, 2, 1

Number showed by Krunal in 5 rounds: 4, 2, 1, 4, 2

For second testcase:

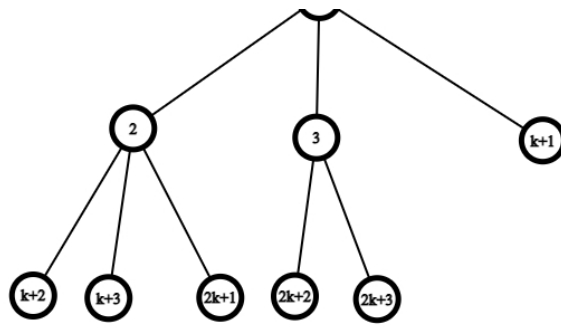
Number showed by Ishan in 7 rounds: 2, 2, 2, 2, 2, 2, 2

Number showed by Krunal in 7 rounds: 7, 7, 7, 7, 7, 7, 7

D. Parent & Child

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

You are given an infinite k-ary full tree as given below. Node 1 is the root of the tree.



k-ary tree is a tree in which all nodes except leaves have k children.

There are two types of queries:

1 n k - return the parent of the n^{th} node in k-ary tree.

2 n m k - return the m^{th} child of the n^{th} node in k-ary tree.

Input

The first line contains Q - the number of queries.

The next Q lines contain either of queries as given in the problem statement.

$$1 \leq Q \leq 10^5$$

$$1 \leq n \leq 10^9$$

$$1 \leq k \leq 10^9$$

$$1 \leq m \leq k$$

Output

Print the answer for each query in the new line. Print 0 for the parent of the root node.

Example

input	Copy
<pre> 5 1 1 3 2 1 2 3 1 5 3 1 1000000000 3 2 1000000000 3 3 </pre>	
output	Copy
<pre> 0 3 2 3333333333 3000000001 </pre>	

E. Maximum Cost

time limit per test: 1 second

memory limit per test: 256 megabytes

input: standard input

output: standard output

You are given a cost of all the characters from 'a' to 'z' and two strings of length N and M containing lower case characters. Count the maximum final cost among all possible common subsequences.

The final cost for any string is the sum of the cost of each character in the string.

A subsequence is a sequence that can be derived from another sequence by deleting some or no elements without changing the order of the remaining elements.

Input

The first line contains N and M - the length of the first and second string. ($1 \leq N, M \leq 10^3$)

The next line contains first the string.

The next line contains the second string.

The next line contains 26 space-separated integers denoting the cost of the characters from 'a' to 'z'. ($1 \leq cost \leq 10^5$)

Output

The only line contains the maximum final cost.

Examples

input	Copy
<pre> 4 4 abcd dbca 1 </pre>	
output	Copy
<pre> 2 </pre>	
input	Copy
<pre> 3 3 jaa aa1 </pre>	

1 1 1 1 1 1 1 1 1 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
output Copy
7

Note

For the 1st test case, the common subsequence is "bc" which has the maximum final cost.

For the 2nd test case, the common subsequence is "j" which has the maximum final cost.

F. Tushar and CAT preparations

time limit per test: 1 s.
memory limit per test: 256 MB
input: standard input
output: standard output

Tushar is preparing for CAT. As a part of preparation he decided to create some books. Each one of his books is made of blue, silver and cyan colored pages. He writes down the ingredients of his book as a string of letters 'B' (blue), 'S' (silver) 'C' (cyan). The ingredients represents the colored pages required to make one book.

Tushar has n_b blue papers, n_s silver papers and n_c cyan papers in his room. Besides, the shop nearby has all three papers, the prices are p_b rubles for a blue paper, p_s for a silver paper and p_c for a cyan paper.

Tushar has r rubles and he is ready to shop on them. What maximum number of books can he make? You can assume that Tushar cannot slice any of the paper in two. Besides, the shop has an unlimited number of papers of each color.

Input

The first line of the input contains a non-empty string that describes the ingredients of his book. The length of the string doesn't exceed 100, the string contains only letters 'B' (uppercase English B), 'S' (uppercase English S) and 'C' (uppercase English C).

The second line contains three integers n_b, n_s, n_c ($1 \leq n_b, n_s, n_c \leq 100$) — the number of paper of blue, silver and cyan color. The third line contains three integers p_b, p_s, p_c ($1 \leq p_b, p_s, p_c \leq 100$) — the price of one blue, silver and cyan colored paper in the shop. Finally, the fourth line contains integer r ($1 \leq r \leq 10^{12}$) — the number of rubles Tushar has.

Please, do not write the %lld specifier to read or write 64-bit integers in C++. It is preferred to use the cin, cout streams or the %I64d specifier.

Output

Print the maximum number of books Tushar can make. If he can't make any book, print 0.

Examples

input Copy
BBBSSC 6 4 1 1 2 3 4
output Copy
2

input Copy
BBC 1 10 1 1 10 1 21
output Copy
7

input Copy
BSC 1 1 1 1 1 3 1000000000000
output Copy
2000000000001

G. Aman, Bhavya and Chocolates

time limit per test: 3 s.
memory limit per test: 256 MB
input: standard input
output: standard output

Aman and Bhavya love chocolates. They have two types of chocolates :red velvet and blue berry.

They marked n distinct points in the plane. i -th point is point (x_i, y_i) . They want to put exactly one chocolate in each of these points such that the difference between the number of red velvet and the blue berry on each horizontal or vertical line is at most 1.

They can't find a way to perform that! Please help them.

Input

The first line of input contains integer n ($1 \leq n \leq 2 \times 10^5$).

The next n lines contain the information about the points, i -th line contains two integers x_i and y_i ($1 \leq x_i, y_i \leq 2 \times 10^5$), the i -th point coordinates.

It is guaranteed that there is at least one valid answer.

Output

Print the answer as a sequence of n characters 'r' (for red velvet) or 'b' (for blue berry) where i -th character denotes the type of chocolate in the i -th point.

Examples

input Copy
4 1 1

1 2	
2 1	
2 2	
output	Copy
brrb	
input	Copy
3	
1 1	
1 2	
2 1	
output	Copy
brr	