Problem A

Hawai Misti !!

Time Limit : 1 second

“Nijhum Dwiph” is an island of Bangladesh situated on the south of Hatiya upazilla. In that area, there is no electricity facility. For that reason, the residents of that area are deprived of modern world civic facilities. Traditionally the people of “Hatiya” and “Nijhum Dwiph” having a strong mentality of hospitality. Only for that reason, anyone can be fascinated to visit that area. Here situated “Kala Mia” sweets shop named for a person “Kala Mia”, which is popular for “Hawai Misti”.

The shop always offers a package, If you buy sweets and eat them there, you will get an extra 1 sweets for every k sweets. Here k is a key number, which varies over time to time.

You eat sweets in rounds. Lets say you get q sweets **(q > 0**) in current offer for next round. Kala Mia has another offer which is you will get (q+1) sweets if current round is odd and (q-1) sweets otherwise. Rounds starts from 1.

For example , if n = 10 and k = 3 .

Round 1 : You eat 10 sweets in first round and supposed to get 3 for next round . Since it is odd round you will get 4 sweets .

Round 2 : You eat 4 sweets in second round and supposed to get 1 for next round. Since it is even round you will get 0 sweets.

You finish eating when you don’t have any sweets to move to next round.

Input

The input file contains two numbers N and K where N represents the number of sweets you bought, K represents the key number for which you will get an extra sweet. Each integer ranges (0 ~ 5000001) and K >= 2 . Process the inputs until the end of the file. There will be at most 100 test cases .

Output

For each input, produce one line of output the required number of sweets has to pay by “Kala Mia”.

Sample Input

10 3
10 4
15 2

Sample Output

Total Number of Hawai Misti is : 14
Total Number of Hawai Misti is : 13
Total Number of Hawai Misti is : 28

Problem Setter : Machbah Uddin , 7th Batch
Assistant Professor, Bangladesh Agricultural University

Problem B

Divide Candy

Time Limit: 1 second

Aishi, Proma, and Ratri are three brilliant kids in Dreamland. Their favorite uncle Mr. J lives in Candyland. He has come to visit his adorable nieces with a bag of Candies . There are ***n*** candies in the bag and all the ***n*** candies are different types. He wants to give all the candies to the kids, but he has one condition. If Aishi, Proma, and Ratri get ***x***, ***y*** and ***z*** candies respectively then there must be,

$$x+y=kz$$

Where **x, y, z, *k*** are positive integer and each of them will get at least one candy, that is ***(1 ≤ x, y, z ≤ n)***.

As they are busy to eat candies and you are a great mathematician, so you are asked to calculate the number of ways they can distribute the candies according to above constraints. Two ways are considered different, if in one way any one of them gets at least one different candy than the other way.

Since the answer can be very large, you should find the answer modulo 1000000007.

Input

First line of the input is number of test cases T (≤100000), then T test cases follows. Each case have two positive integer n and k . (1 ≤ n, k ≤ 100000).

Output

For each test case print one line in format “Case I: W” where I is case number and W is the number of ways to distribute the candies modulo 1000000007.

Samples

Input	Output
2 3 2 4 3	Case 1: 6 Case 2: 24

Explanation of Samples

In the first case, N=3 and K=2, then each of them (Aishi, Proma, Ratri) will get only one candy i.e. x=1, y=1, z=1 and x+y = 2z. If we numbering 3 types of candy as (a, b, c) then there are only six possible way to distribute the candies among them and they are (a,b,c), (a,c,b), (b,a,c), (b,c,a), (c,a,b) and (c,b,a).

Problem Setter : Partho Saha
Software Engineer, Enosis Solutions.

Problem C

Estimated Bus Fare

Time Limit: 2 second

Road Transport Authority wants to find estimated income from bus fare. As the ticketing system of bus is not digitalized yet and maintained by third party, there is no actual data. From surveillance camera they found the starting point and ending point of a bus journey of a person. There may be multiple route from one point to another, which varies by fare. In this case, they want to consider the minimum fare. You should consider fare as 0 if the starting point and ending point is same (even if there is any fare mentioned in the input).

Input

Input starts with two integer, N (number of node) and E (number of edge). In the next E lines, there will be 3 integers, N1 (node 1), N2 (node 2) and C (Cost (fare) from N1 to N2 and vice versa).

In the next line, there will be a single integer Q (query). Next Q lines consists of two integer, N3 (node 3) and N4 (Node 4).

There will be only one test case.

1<=N<= 300

1<=E<=10000

0 <= N1,N2,N3,N4 <= N -1

1 <= Q <= 100000

Output

Print only one integer, which is the summation of costs from N3 to N4.

Result will fit into 32 bit signed integer .

Sample I/O

Sample Input	Sample Output
3 7 1 1 97 1 2 130 1 2 129 2 0 89 0 2 107 0 0 134 2 0 138 10 1 2 0 2 2 1 1 0 2 0 0 0 0 2 2 1 2 1 0 1	1219

Problem Setter: Mahim-Ul Asad

Software Engineer, BizMotion Limited

Problem D
Least Significant Bit [LSB]

Time Limit : 1 second

Audry is a class eight student. She likes to read a lot of books on different topics. Recently she started reading about the number systems. And she got very excited when she came to know about various number systems like Unary, Binary, Octal, Decimal, Hexadecimal etc. Now she started learning the decimal to binary conversion.

Let's have some discussion on decimal and binary number systems -

Decimal is the base 10 number system what we use in everyday life counting. There are ten different symbols in this system to represent any number and they are 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 which also represents the numbers from zero to nine. And the placeholder these numbers occupied known as unit place [placeholder value 10^0]. When it's come to the number ten we don't have any singular symbol to represent it. Here, we need to introduce a new placeholder with power of 10 to represent numbers from ten to ninety nine. This new placeholder is known as tens place [placeholder value 10^1]. After that we again need a new placeholder with power of 10 and it is known as Hundreds place [placeholder value 10^2] and so on. So, basically we can express the number 368 as 3 hundreds, 6 tens and an 8.

On the other hand, binary is the base 2 number system and has only two symbols [0, 1] to represent any number. We can represent zero and one with these symbols in unit place. To represent the number two we will be need a new placeholder. But now for the base 2 number system, each placeholder value will be the power of 2. For the number two, the placeholder value is 2^1. And to represent the number four we need another new placeholder with power of 2 [2^2] and to represent the number eight we will be need another new placeholder with power of 2 [2^3] and so on.

The binary number system has some extensive use in Computing Sciences. In Computing Sciences, each placeholder of base 2 number system can be represents as bit. And for a binary number, the Least Significant Bit [LSB] is the rightmost bit and the Most Significant Bit [MSB] is the leftmost bit.

Here is some numbers with their binary representations and binary to decimal conversion -

Decimal	Binary	Binary to Decimal with placeholder values

0	0	$0*2^0 = 0$
1	1	$1*2^0 = 1$
2	10	$1*2^1 + 0*2^0 = 2$ [New placeholder]
3	11	$1*2^1 + 1*2^0 = 3$
4	100	$1*2^2 + 0*2^1 + 0*2^0 = 4$ [New placeholder]
5	101	$1*2^2 + 0*2^1 + 1*2^0 = 5$
6	110	$1*2^2 + 1*2^1 + 0*2^0 = 6$
7	111	$1*2^2 + 1*2^1 + 1*2^0 = 7$
8	1000	$1* 2^3 + 0*2^2 + 0*2^1 + 0*2^0 = 8$ [New placeholder]
9	1001	$1*2^3 + 0*2^2 + 0*2^1 + 1*2^0 = 9$
10	1010	$1*2^3 + 0*2^2 + 10*2^1 + 0*2^0 = 10$
11	1011	$1*2^3 + 0*2^2 + 1*2^1 + 1*2^0 = 11$
12	1100	$1*2^3 + 1*2^2 + 0*2^1 + 0*2^0 = 12$
13	1101	$1*2^3 + 1*2^2 + 0*2^1 + 1*2^0 = 13$
14	1110	$1*2^3 + 1*2^2 + 1*2^1 + 0*2^0 = 14$
15	1111	$1*2^3 + 1*2^2 + 0*2^1 + 1*2^0 = 15$
16	10000	$1*2^4 + 0*2^3 + 0*2^2 + 0*2^1 + 0*2^0 = 16$ [New placeholder]
31	11111	$1*2^4 + 1*2^3 + 1*2^2 + 1*2^1 + 1*2^0 = 31$
32	100000	$1*2^5 + 0*2^4 + 0*2^3 + 0*2^2 + 0*2^1 + 0*2^0 = 32$ [New placeholder]
33	100001	$1*2^5 + 0*2^4 + 0*2^3 + 0*2^2 + 0*2^1 + 0*2^0 = 33$

We can also convert decimal number to binary easily using the reminder method. It involves dividing the decimal number by 2 recursively until it becomes zero. The reminder series from bottom to top found in this approach is the binary representation of that decimal number. That means the first reminder we get with dividing the decimal number by 2 is the LSB and the last reminder is the MSB.

Little Audry found an interesting pattern on the binary number representation. She noticed that each consecutive binary number has alternative symbol/digit for the LSB. For example, the LSB for the number 31 is 1, for the number 32 it is 0 and for the number 33 it is 1 again.

Audry found out that you are a Computer Science student, that's why she asked your help to write a program to identify the LSB for a given decimal number.

Input Specifications:

The input set will start with an integer **N** [*0 < N <= 100*] denotes the number of input. Next N lines will contain N integer **D** [*0 <= D <= 1000*] denotes the decimal number.

Output Specifications:

The output will be pretty simple. You have to write the LSB value of the corresponding integer D in a new line.

Sample Input:

5
3
8
13
14
16

Sample Output:

1
0
1
0
0

Problem Setter: Anamul Kabir
Software Engineer, Enosis Solutions.

Problem E

Gennady Korotkevich

Time Limit: 1 second

You are going to hack tourists codeforces account . You came to know that tourist uses only digits (0 to 9) as password and it is divisible by 11 . You also know some(zero or more) digits of the password . The unknown digits are given as '*' . As , tourist likes large numbers , the password is going to be as large as possible . If you can replace all the '*' with digits (0 to 9) and that is the maximum number possible which is divisible by 11 , *congratulations* , you have hacked tourists codeforces account .

Formally , you are given a number in which some(zero or more) digits are '*' . You can replace any '*' with any digit and report if the number is **divisible by 11 or not** . If there are more than one number you can make , we want to know the **maximum** one which is divisible by 11 .

If it is impossible to make the number divisible by 11 , you have got wrong information about tourists password .

Input

Input start with T (1 <= T <= 50) , number of test cases. Following T lines contains a string s (1 <= |s| <= 100000) which can be tourists password .

Output

For each test case print : "Case X: N" in a line where X is the test case number and N is the maximum number you can make which is divisible by 11 . If , it is impossible to make the number divisible by 11, print: "Case X: -1"

No number in input or output can contain leading '0' .

Sample I/O

Input	Output
4 9 1* *9** *5	Case 1: -1 Case 2: 11 Case 3: 9999 Case 4: 55

Problem Setter : Abdullah Al Shaad

Problem F

Bird Lover

Time Limit: 1 second

Shawon is my little brother and he loves birds so much. He has bought some birds from a birdshop.

He asked the shopkeeper about the breeding characteristic of his(shopkeeper) birds. The shopkeeper told him that when a bird reaches age A, it gives birth to M child birds every year and each bird dies at the age of D after giving birth of its child in age D. He also added that all of his bird shares the same characteristics and their child birds would inherit all these characteristics from their parents.

Shawon has bought N birds from the shop and all of them are one year old. Now he wants to calculate how many alive birds he will have after Y years from now. After trying some time he has realized that the calculation is too difficult for him to calculate. Can you please help him to calculate?

Input

Input starts with an integer number T which is test case ($1 \le T \le 1000$). Each test case contains two lines of input. The first line contains 3 integers A ($2 \le A \le 10$), M ($1 \le M \le 5$) and D ($A < D \le 25$) and the second line contains 2 integers N ($1 \le N \le 5$) and Y ($1 \le Y \le 25$).

Output

For each test case, print a single line "**Case X: R**", where **X** is the case number starting from 1 to **T** and **R** is the number of total alive birds after **Y** years.

Sample Input

2

3 1 5

2 4

3 1 5

1 7

Sample Output

Case 1: 6

Case 2: 8

Explanation:(Case 1)

In year 0 or the year when he bought those birds, **the number of birds is 2**. Each of them is 1 year old.

In year 1, each of the two birds will be 2 years old. **The number of birds is 2.**

In year 2, each of the two birds will be 3 years old and each of them will give 1 child. So the **number of birds is 4**, they are 3, 3, 0, 0 years old. (The children are 0 years old on the year they are born).

In year 3, Their age will increase to 4, 4, 1, 1. The birds with age greater than 3 give birth. So here each bird with age 4 gives 1 child. **So there will be 6 birds total** of age 4, 4, 1, 1 , 0, 0.

In year 4, their age will increase to 5, 5, 2, 2, 1, 1. Here each of the two birds with age 5 will give birth to children and then they will die. So there are six birds alive and age of the alive birds are 2, 2, 1, 1, 0, 0.

So after 4 years he will have 6 alive birds.

Problem Setter: Shahin ShamS

Problem G

After Lockdown

Time Limit: 1 second

Just like us, all the frogs are staying home and maintaining social distance. Two frogs Bogart and Ribbit are friends. When this lockdown ends , Bogart will visit Ribbit . Before visiting Ribbit, Bogart will go to shop to buy gift for his friend. Bogart knows the distance of shop from his home and from Ribbit's home. He can move at most k unit length by each jump. He wants to know minimum number of jumps he needs to make to reach Ribbit's home.

Input

Input start with T (1 <= T <= 100000) , number of test cases. Each test case contains 3 integers a,b and k (1 <= a,b,k <= 10^18) – the distance between Bogart's home and shop , the distance between Ribbit's home and shop and maximum distance Bogart can move by each jump respectively.

Output

For each test case print the minimum number of jumps Boggart needs in a line .

Sample I/O

Input	Output
4 10 20 5 13 12 5 5 5 1 1222282828 1912181817378 92972	6 6 10 20580435

Note : In the first sample , Bogart needs 2 jumps to reach shop and 4 jumps to reach Ribbits's home from shop. So, he needs 6 jumps in total.

Problem Setter : Abdullah Al Shaad

16th Batch