Take-off
Programming Contest
F A L L - 2 0 1 8

Problem Set

Organized By:

Daffodil International University

Department of CSE

CPC Computer & Programming Club

Platform:

CodeMarshal

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A. It’s on the house.

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

What is the difference between a man and a legend? A man may change life of a person or a couple of persons. But a legend will change life of thousands or millions. Legends comes in all forms. A legend may be an army general, a politician, an artist, or even for our case a Comic Book Writer.

Stan Lee is the creator of *Marvel Universe*. He have created a Universe full of super heroes and possibilities and kept millions of fans around the globe entertained. He wrote stories that encouraged many in seeing dreams. Many to have the enthusiasm to touch the sky. Marvel C15inematic Universe is also a brainchild of this man. He had the superpower to attach people to stories that never happened, or may never happen. Although this Semester Take-Off is dedicated to DC – Comic we would like you to take a moment and write a portion of code for the fallen hero.

Don’t worry we won’t make you create anything complex. This problem is on the house. Just copy paste the following code (or type, as you like) and submit.

```
#include<stdio.h>
int main ()
{
   printf("Rest in peace legend!\n");
   return 0;
}
```

Input

There is no input in this problem. Only write the code exactly and submit.

Output

Print "Rest in peace legend!" without quotes.

Don't forget to print the newline character('\n') at the end of the line. Or just copy and paste the code segment given above.

Sample Input	Sample Output
/* There is no input for this problem */	Rest in peace legend!

Problem setter: **Mehedi Imam Shafi**

B. Tricking Steppenwolf!

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

It's been many years for wars and internal fights. Super heroes are losing their power. So they decided not to fight anymore with each other and wanted to combinethe three Mother Boxes to form unity which would give them tremendousamount of power as we know Mother Boxes are major sources of power. But sadly villain Steppenwolf came back again and wants all three boxes to become more powerful than ever and destroy the Earth. Though he doesn't know who have how many boxes, but he knows either The Amazonian or The Atlanteans or the human can have those. Anyone of them can have more than one boxe. So he is trying to collect them.
Now as Steppenwolf is trying to collect the boxes, he will be powerful only if he can collect all three boxes and combine them. Otherwise he will lose his existing power, if he tries to combine less than three boxes. And as he is very weak in calculations, he wants your help to write a program which will show "Become more powerful!" if he can combine the three boxes and become powerful and show "Loses his power!" otherwise.

Input

Input contains three integers a, b and c ($0 \le a,b,c \le 3$), denoting the number of boxes Amazons, Atlanteans and human have sequentially. the For a clearer understanding, check the sample input.

Output

Print **"Become more powerful!"**(without quotes) or **"Loses his power!"**(without quotes) from the above story.

Sample Input	Sample Output
1 1 1	Become more powerful!
0 0 0	Loses his power!
1 1 0	Loses his power!

Problem Setter: **Amina Ahmed Jaya**
Alternate Writter: **Nesar Ahammed**

C. Spiderman !!!

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

Spiderman!!! How the Spiderman goes one place to another place . By swinging web to any obstacles.
One day Spiderman thought that he will calculate what distance he covered by swinging. He have the co-ordinates of two points , in which he swung and from which he swung. Now write a program to help Spiderman as he is weak in math that calculates the total distance covered by Spiderman . But spiderman can help you , he knows the theorem to calculate distance between two point . If the points are A (**X1,Y1**) and B (**X2,Y2**) and distance is d ,then

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Input

The first line contains two integers **X1** and **Y1** (0<=X1, Y1<=100) , the co-ordinate of the point , from which spiderman swang .
The next line contains two integers **X2** and **Y2** (0<=X2, Y2 <=100) , the co-ordinate of the point , in which spiderman swang .

Output

Print one line that contains the distance covered by Spiderman . Print the result rounded to two decimal places. Please don't forget the new line at the end of output!

Sample Input	Sample Output
1 1 2 2	1.41

Problem Setter: **Ferdouse Ahmed Foysal**
Alternate Writer:

D. The Wonder Equation

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

Today we will tell you the story of a Princess,
Diana, Princess of the Amazon island. She was trained to be an unconquerable warrior. When Diana was a child her mother Queen Hippolyta always telling her the story of a God. Actually, an evil god named Ares known as the god of war and destruction. One day Diana heard from a spy of his island that there is a war going on in a country called Kasnia and Ares (the god of WAR) is the reason for that war. After hearing this, Diana decided to go to Kasnia and kill Ares. Being true to her thoughts she arms herself with the "Godkiller" sword and left the island and reach the place where war is happening. Diana was shocked when she went to Kasnia. Because of people In there, they are not normal!. Whatever you ask them, They will not answer your question at first, rather than they will give you a Math equation to solve and then they may answer your question. strange people !!
When did Diana ask them "Where is Ares?". **People there give her this equation "$AX^2 + BX + C = 0$" to solve and also they will give the value for any 3 variable out of 4 variable (X,A,B,C) of this equation and give you the fourth value as Negative value.** (Let, assume all the character of this equation as a variable) . **You have to determine the missing one.**

For Example,
If x = 2, A= 3, B= 4, C = -1 as C is Negative, that means you have to calculate the value for C.
C will be,
C = -AX^2 - BX
C = -3*(2*2) - 4*2
C = -20.00

Since Diana is an Amazonian warrior, she is good at Combat field but not good at math. That's why Diana is asking for your help. After all, you are a world-famous mathematician, who also knows coding. Now Help Diana to solve this equation so that she can find Ares and able to kill him.

Input

The first line of input contains a line consist of four integers **X , A , B** and **C**. The value of one of these will be **Negative**, other three will be in between 1 and 1000 You have to determine the value for that variable that has **Negative** value. For more detail, please check the explanation section below.

Output

If the value of variable **X** is Negative then you doesn't need to solve the equation for X rather than just print **"We can find the value of X using Bashkara's Formula."** (without quotes). Otherwise, Print the value of missing variable rounded to two decimal places. Don't forget to put a "new line" at the end of the output!

Sample Input	Sample Output
2 3 4 -1	-20.00
-1 10 20 30	We can find the value of x using Bashkara's Formula.
8 -1 2 5	-0.33

Problem setter: **Raihanur Rahman**
Alternate Writer: **Mehedi Hasan**

E. Discount Calculator (DC)

Time Limit: **1.0 second** **Memory Limit:** **6800 MB**

Description:

You remember Alfred? The good old butler of Bruce
One night he was going this new super cool super shop for superhumans in Gotham – Shopno. He had to buy some grocery. He knew there was a promotional offer going in Shopno, if someone pays using NexusPay he'll get an instant **M%** cash back of the paid amount. One catch though, **the minimum amount on which cashback is available is Tk. 1**. (Yes, now Gotham's currency is Taka, yay!!)
Now as Bruce is not half as rich as Princess mAina, Alfred would like to get the most out of this offer. Now it's your job to tell us how much worth of groceries can Alfred buy if he has an initial balance of **Tk.N** in his account.

Input

The first line of the input contains a number **T** (1 <= T <=100), the number of test cases. Each following line contains two space-separated integers N (0 <= N <= 10,000) and M (0 <=M <=99). Where N and M are the initial balance and cashback percentage consecutively.

Output

For each test case print the case number and the required output (2 digits after decimal point). Check the sample I/0 for the exact output format.

Sample Input	Sample Output
3 100 30 6800 16 7133 3	Case 1: 142.51 Case 2: 8095.10 Case 3: 7353.60

Problem setter: **Debashish Saha Pranta**
Alternate Writer: **Muhaiminul Islam Jim**

F. Shohomot Vai

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

In the country HunuLuLu, there is a trend in young generation of falling into lines of any Boro Vai's speech! Whenever their Boro Vai enunciates something about anything, you will never find those young valetries to be tired of saying **"Shohomot Vai"** after every sentences!
As the National Election will be held in a very short time, a well known party **ACM** is focusing on campaigning about their agendas in every possible way! They are now even hiring SuperHeroes/SuperVillains all the way from Hollywood to run campaign!
This Friday, **ACM** has brought **Joker** to campaign at a JONOSHOVA at Baracuda-3! As of studying the nature of peoples of HunuLuLu before coming to the country HunuLuLu, it did not take much time for **Joker** to get to know about **"Shohomot Vai"** chants right after every single sentence during a political speech!
Joker is really worried about this upcoming **"Shohomot Vai"** hazards and as his script is already written by you, Joker wants you to calculate the **total number of "Shohomot Vai"** chants by each people are going to be heard and write it as of a pre-preparation plan of Joker!
Interesting fact is that not all the attendant people will chant "Shohomot Vai" as in that JONOSHOVA, everyone is not from the ACM party and we know, **only the followers of ACM will chant!**
There are N rows and M columns in the JONOSHOVA and it is jam-packed with the crowd. **Given the number of sentences in Joker's speech and a grid of N rows and M columns where the followers of ACM are shown as A and others are as O, you have to meet Joker's demand!

Input

The first line of the input contains an integer **T**, (1 <= T <= 50) , the number of test cases. Each test case contains three integers, **K, N** and **M** (1 <= K <= 5 and 1 <= N,M <= 200) where K is the number of sentences in

Joker's script and **N** and **M** are number of rows and columns respectively. Then there is a **N*M** grid characterized as mentioned above.

Output

For each test case print "Case X: "(without quotes) Where X is the running test case number, followed by an integer T, the total number of chants which will be heard and then print T lines of "Shohomot Vai" (without quotes). Its is ensured that there will be at least one follower of ACM!

Sample Input	Sample Output
2 1 3 3 OOA AOO AAO 2 2 5 OOOAO OOOOO	Case 1: 4 Shohomot Vai Shohomot Vai Shohomot Vai Shohomot Vai Case 2: 2 Shohomot Vai Shohomot Vai

Problem setter: **Azharul Islam Tazib**
Alternate Writter: **Nesar Ahammed**

Explanation for the first input :
N = 100 , M = 30
1st : Amount = 100 , 30% of Amount = 30 Taka , Total Grocery till now := 100
2nd : Amount = 30 , 30% of Amount = 9 Taka , Total Grocery till now := 130
3rd : Amount = 9 , 30% of Amount = 2.7 Taka , Total Grocery till now := 139
4th : Amount = 2.7 , 30% of Amount = 0.81 Taka , Total Grocery till now := 141.70
5th : Amount = 0.81, 30% of Amount = 0.24 Taka , Total Grocery till now := 142.51

G. Even Punch

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

Do you know Steppenwolf? He is an immortal with vast superhuman strength, endurance and speed, capable of lifting about one hundred tons and jumping huge distances easily. Also, he has superhuman reflexes and a high degree of invulnerability, which increases with his battle armor and allows him to resist most physical and

energetic attacks. Now that he has attacked earth, it's been a huge headache for the members of Justice League.

To make the battle plan easier, Batman assigned the task to analyze Steppenwolf's power to Bat-computer. Finally, Bat-computer generated a report. It stated the power of Steppenwolf as a binary number. Weird? I know. But who am I to judge the Bat-computer? Sadly enough, no hero but Superman is capable of fighting a demon with such level of power.

As Superman was lately exposed to Kryptonite and died for a little while, his powers have changed a bit. In each stroke, he can decrease the power of his opponent by a number of **N** (N≤P), where **N** is a **positive even number** and **P** is the **current power** of the opponent.

Now, given the power of Steppenwolf, you have to tell us if Superman can defeat him or not. Steppenwolf is defeated when his power gets down to zero.

Input

The first line of the input contains a number **T** (<=100), the number of test cases. Each following line contains a binary number **K**, the power of Steppenwolf. The decimal value of the given binary number does not exceed $\mathbf{2}^{100000}$.

Output

For each case, print **"YES"** (without quotes) if Superman can defeat Steppenwolf and **"NO"** (without quotes) otherwise.

Sample Input	Sample Output
1 100010101001	NO

Problem setter: **Muhaiminul Islam Jim**

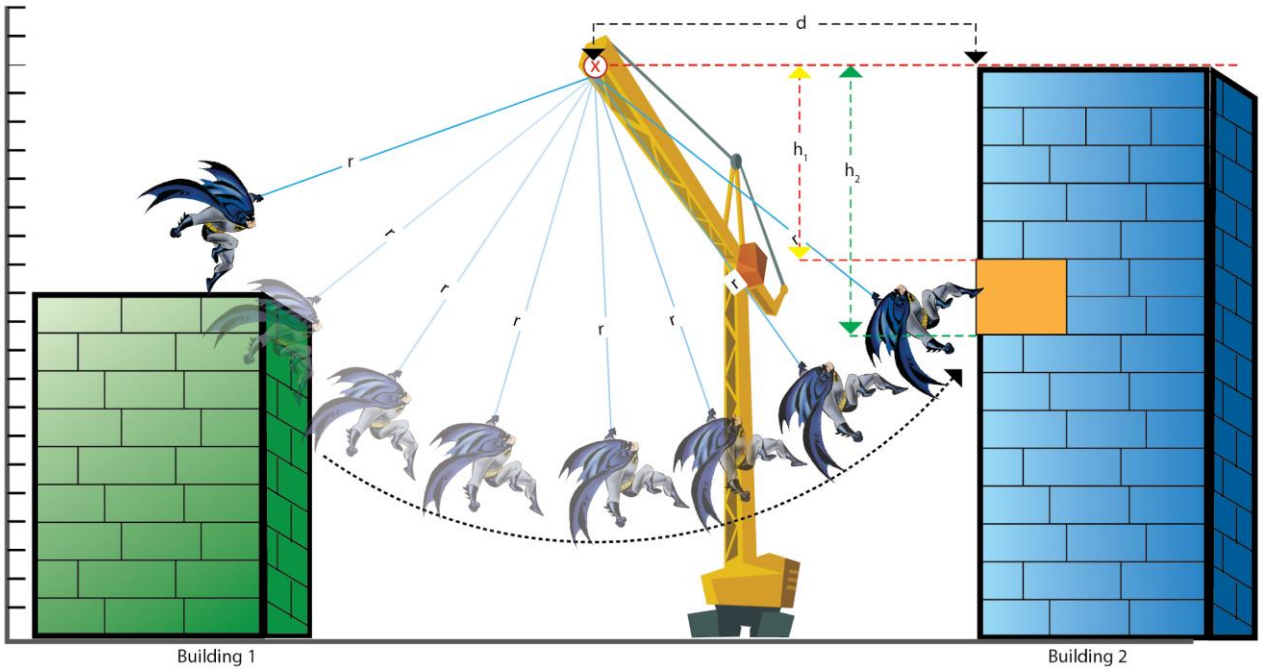
Alternate Writer: **Amina Ahmed Jaya**

H. The Dark Knight

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

Do you know the Joker? from the movie Batman: The Dark Knight.
I will tell you the story of the Joker.
Joker, although is a lying psychopath. Everybody knows that despite Joker madness, he really was a "Mastermind". The very first thing Joker did is rob a mafia controlled bank named Gotham National Bank. Joker walked up to the bank manager and held up a bomb for all to see. He said, "Give me all the money, right now!".
But suddenly an alarm went off because the manager pressed a red button under his desk. Batman (The Protector of Gotham City) came there and heard from nearby people that Joker kept all the innocent people as hostage and closed all the entrance so that no one can enter inside. Now Batman has to rescue all the innocent hostages. Luckily a window of the bank is open. Immediately he decided he will enter the bank by this window. Afterwhile, he noticed that there has a construction crane in front of the bank.



Then he goes to the roof of the next building which is located straight opposite of the bank. The crane is actually situated middle of both buildings. As Batman always carry crossbow and rope, he hooked up the rope of length **r** with the crane at point X by using his crossbow. He knows that the distance between the point X and the rooftop of the bank is **d**. He also calculated the distance between the window and the rooftop of the bank and found distance **h1** and **h2**
Where,

h1 = The length between the top side of the window and rooftop of the bank
h2 = The length between the bottom side of the window and rooftop of the bank

The height of the Bank's building and top of the crane point X is the same from the ground. **He will jump from the opposite building so that he can go through the window and enter into the bank. If he touches any of the edges/sides of the window he will not be able to enter inside. Can you answer if he can do that?**

Input

The first line will contain an integer **T** (1 <= T <= 1000) denoting the number of test cases. Then on each test case you will be given four space-separated Integer **r,d, h1,h2**. Where the value of **r,d, h1,h2** will lie between 1 and $\mathbf{10^9}$ and always **h1 < h2** holds.

Output

For each test case print "Case X: "(without quotes) Where X is the running test case number. then print **"Yes"** (without quotes) if Batman can reach to the window else print **"No"** (without quotes).

Sample Input	Sample Output
3 10 8 2 7 9 8 6 8 7 8 4 8	Case 1: Yes Case 2: No Case 3: No

Problem setter: **Fuad Hasan**
Alternate Writter: **Mahmud Sajjad Abeer**

I. No Good In This GoodBye

Time Limit: **1.0 second** **Memory Limit:** **1024 MB**

Description:

"How lucky we are to have someone who makes saying goodbye so hard!"

So far, we were talking about the DC Universe, where the fictional superheroes evolved. The universe I'm going to introduce you today is called **CM Universe** founded by The Great **Matha Mota Rogchota Noradhom**. The people in this universe are weird and different. They fight for creating the most beautiful universe with their problem-solving skills. The good thing is, anyone can be a hero here. Or is it really? That's the most tricky part. Some skills aren't god gifted and are only achievable through practice. As CM universe serves the best, they need quality problem solvers

as well. So, you must prepare yourself really well. The Great Noradhom has been working with **DIU** since **2016** giving quality time & effort and training some promising heroes to lead the future. We can already notice huge improvements. But alas! Not everything is going according to the proposed plan and he's also disappointed as the heroes aren't persistent and hard working enough. It's like, "*He's done nothing wrong but somehow he is losing*". Do you think *Habibi* **.H.A.S** a solution this time? Despite his actions, only you can cheer him up*(Who knows! He might be leaving soon if you can't create any reason for staying)* by solving the following challenge:-

Let's be straight. You have to create a program that can take a **C program** as input and output "Compilation Error" or "Time Limit Exceeded" or "Runtime Error" or "Accepted" or "Wrong Answer" as a solution verdict of a problem. Well, the rules are different for this problem. The verdicts for this problem are defined below:-

Compilation Error(CE): The solution writers are very smart and they only make silly mistakes on the code. They either add a semicolon at the end of the line where it's unnecessary or forget a semicolon at the end of the line where it's necessary. So, if any of such situation occurs output "Compilation Error". There can be at most 1 case of compilation error on each line. For a successful compilation, a semicolon is mandatory to use at the end of a statement(Check out the sample Accepted code for clarification).

Runtime Error(RE): "Runtime Error" is given when the program crashes before ending. The cases when the program usually crashes:-

1. Divide by zero(0) [Can appear in your problem]
2. Unallocated memory access [Can appear in your program as well if you're missing *address of variable* operator (&) while scanning]
3. Stack Overflow [Won't appear in your problem]

Time Limit Exceeded(TLE): The judge server can handle **100**(CodeMarshal is way faster than that though) process per second. So, if it exceeds **100** processing then output "Time Limit Exceeded". Total process count of the given program is the total iteration done on the loop.

Wrong Answer(WA): For this specific problem if the given code doesn't output a non-decreasing number sequence, output "Wrong Answer".

Accepted(AC): If none of the above verdicts meets the solution, output "Accepted". An empty sequence is also valid.

If you have multiple valid outputs, give only one verdict in the above-mentioned order. i.e: If TLE and WA both occurs, you should choose TLE.

Input Code format: The input code will always be in the given format(May contain mentioned errors),

```
#include<stdio.h>
int main()
{
  int i,n;
  scanf("%d",&n);
  for(i=A;iBC;iDE)
  {
    printf("%d\n",F);
  }
  return 0;
}
```

Here,

A = A signed integer
B = A relational operator (<, >, <=, >=, ==, !=)
C = Either a signed integer or variable 'n'(without quotes)
D = An assignment operator (=, +=, -=, *=, /=, %=)
E = Either a signed integer or variable 'n'(without quotes)
F = A variable name, either 'i' or 'n' (without quotes)

The given code will be such that there won't be any unexpected errors which aren't mentioned in the statement.

Input

The first line will contain T (1 <= T <= 50) the number of test cases. Then on each test case, the first line would contain an integer n for the code. Then there will be exactly 11 lines in the mentioned format. The code will surely not contain any unnecessary spaces except for at most 4 leading spaces on each line. You can safely assume that each line won't contain more than 50 characters.

Output

Print a single line for each test case and output the verdict as mentioned on the problem statement.

Sample Input	Sample Output

2
100
#include<stdio.h>
int main()
{
int i,n;
scanf("%d",&n);
for(i=1;i<=n;i+=1)
{
printf("%d\n",i);
}
return 0;
}
0
#include<stdio.h>
int main();
{
int i,n;
scanf("%d",n);
for(i=0;i<=n;i/=n)
{
printf("%d\n",i);
}
return 0;
}
	Accepted
	Compilation Error

Problem setter: **Mahmud Sajjad Abeer**

Alternate Writter: **Pranto Das**