Questions of the week – 1

[Note: If any mistake/error is spotted contact me [I made this while travelling]]

[If any doubts regarding any problem dm me or send it in the group]

[Please don't use Chatgpt or any AI-tools as such, coz this is for practise and your improvement ;-;]

1) **Forest maker** [100 pts] [a brute force problem solving]

You have a 2-d border with infinite height but a d (d is a integer) width. You got N trees, with a,b,c integers for each tree given. 'a' represents size of the upper part of ith tree [the part where leaves start], 'b' represents the size of the wood of ith tree, 'c' represents the distance of the tree from origin or the bottom left corner of the border. A image below explains this more better. [note- c is the number of underscores from origin, look at example below for more understanding]
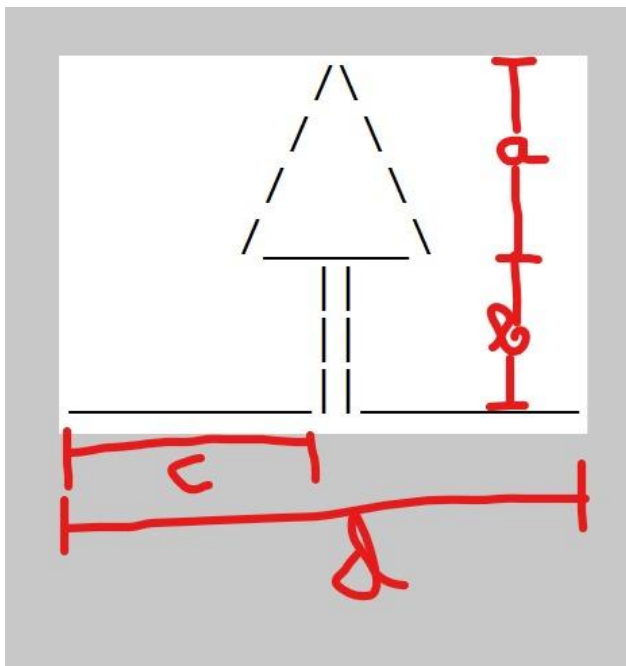
input format:-

first line contains 2 integers N and D.

the next N lines contains 3 integers a,b,c for each N trees.

OUTPUT FORMAT:-

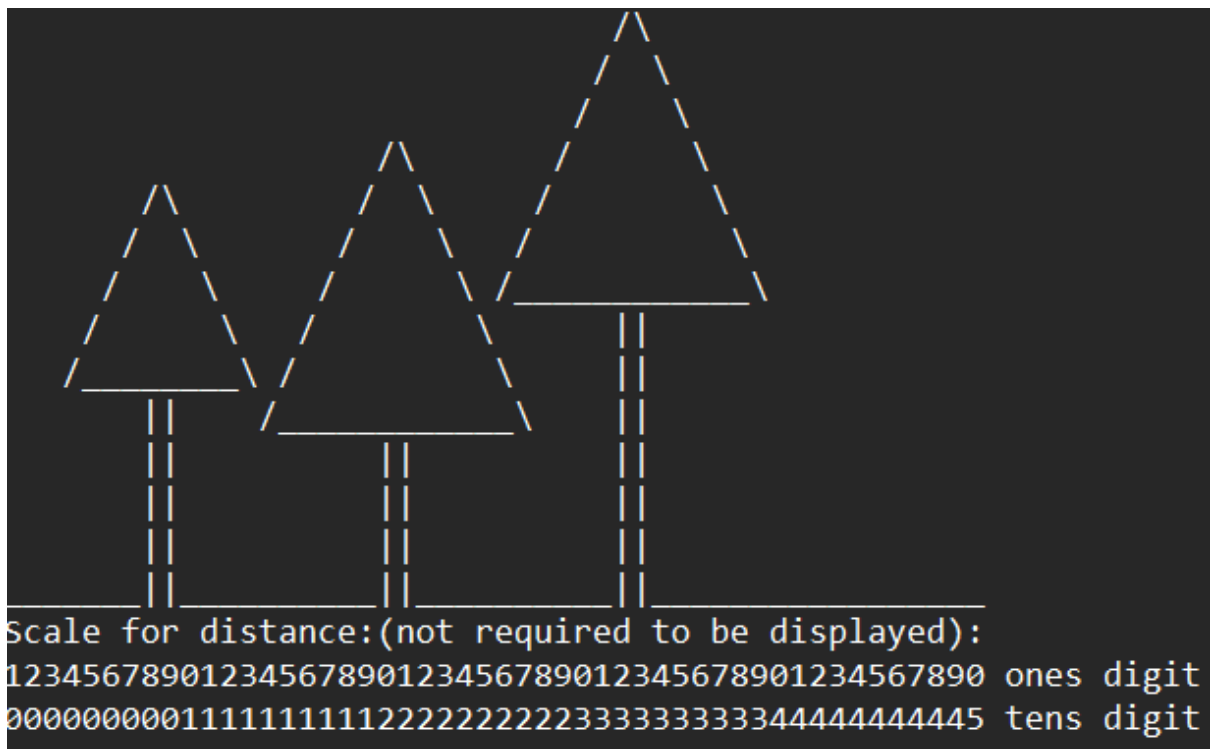print the pattern, IF 2 trees collide with each other, or the tree collides with border, print error.

Examples:-

Example 1:

3 50
5 5 7
7 4 19
7 7 31

Output:


```
                                               /\
                                              /  \
                                             /    \
                                            /      \
                          /\               /        \
                         /  \             /          \
              /\        /    \           /            \
             /  \      /      \         /_____\
            /    \    /        \            ||
           /      \  /          \           ||
          /_____\/            \          ||
              ||    /_____\         ||
              ||         ||                 ||
              ||         ||                 ||
              ||         ||                 ||
          ____||_____||_____||____
Scale for distance:(not required to be displayed):
12345678901234567890123456789012345678901234567890 ones digit
00000000011111111112222222222333333333344444444445 tens digit
```

2nd Example:

3 50
5 5 7
7 4 18
7 7 31

Output:
error

Explanation:
the tree 1 and tree 2 is colliding!

2) **Fibonacci sum** [100 pts] [a simple question on greedy [dont be too greedy]]

we know the Fibonacci series 0,1,1,2,3,5,8,13...

A cool property of Fibonacci series is that you can make any Real number represented by sum of distinct Fibonacci numbers such that no 2 consecutive Fibonacci numbers are added. You are given a integer N find one of such representation of the number N. [N is greater than 2]

Example:

N=10
output: 8,2
because: 10=8+2

N=100
output:89,8,3
because:100=89+8+3.

3) **lexo-binary** [100 pts] [Think before solving]

You are given a positive integer N, now you are allowed to do an operation on its binary form:

select a integer i greater than 0 and less than $ceil\big(log_2(N+1)\big)$ [essentially the size of binary form]

a_i, a_{i+1}, a_{i+2} can be changed to 1,0,0 respectively, where a is the binary representation of N. Example: a operation on N=11 (1011), lets select i as 1 then 1011 will become 1100 {011 became 100}.

You can do this operation multiple times. Find the integer N which is the lexicographically smallest in binary form that you can get after performing this operation multiple times.

Example:

10
Output:
8
Explanation: 9 (1010),then lexicographically smallest that you can get is 8(1000), hence output is 8. [you selected i as 0]

4) pre-gcd [200 pts] [A tough problem, but will explain a lot of stuff]

you are given a integer x. You have q queries for this integer. Each query will have a integer P_i. Find the number of integer Y that satisfy $\gcd(x, y)^{p+1} = x * y$. Answer may be large print modulo 10^9+7. X and P can go till 10^9 [you need to optimize your code]. Number of Testcases wont be larger than 10^3. Number of queries is less than 200. Input format: First line contains integer T the number of testcases, For Each Testcase first line contains 2 integer x and q, next line you have a array of P. Output format: In T lines, each line display total number of Y for each query.

Example:-
1
18 2
2 3
output:
2 1
Explanation: For 0th query only y=12, y=324 satisfy and for 1st query only y = 5832 satisfy.