#<incode 2.0>
Round 1

Time limit: 45 min

General Guideline:

1. Allowed languages: C, C++ and Java
2. Maximum team size : 2
3. Both participants are allowed to use laptops.
4. Each team will be given a Tambola Sheet to mark their completed questions.
5. Each question is worth 20 points.
6. There are additional points for solving questions based on the Tambola sheet provided.
   4 Corners: +20 points
   Each Full Row: +50 points
   Full House: +100 points
   The first 2 people/teams to solve a question get an additional 10 points.
7. Every wrong try leads to a -5 points per try.

Let the coding begin!

1. A positive integer is said to be a perfect number if it is equal to the sum of its positive divisors less than itself. For example, 28 is perfect, because 28 = 1 + 2 + 4 + 7 + 14. On the other hand, 12 is not perfect, because 12 <> 1 + 2 + 3 + 4 + 6. Write a program that prompts the user to enter a positive integer and responds by reporting whether or not the given number is perfect. The program should terminate when the user enters 0.

Input
Each line contains the integer to be checked. The last line contains 0, which terminates the program.

Output
For every input, display true or false, if the the number satisfies the condition.

Sample Input
12
28
0

Sample Output
false
true

2. The numeric system of Romans called Roman Numerals represent the number in different form. Given an integer, find the corresponding Roman numeral. For example 1, 5, 10, 50 and 100 are represented by 'I', 'V', 'X', 'L' and 'C' respectively.

Input
The first line contains the number of test cases N. The next N lines contain 1 integer each between 1 and 100

Output
For every input display the corresponding Roman Numeral.

Sample Input
3
99
36
3

Sample Output
IC
XXXVI
III

3. With strong passwords becoming more essential everyday, given a string, display if the input string qualifies for a weak/good/strong password. The password has 3 characteristics:

- The minimum length is 8 characters.
- Contains upper case characters.

- Contains a numeric digit

A strong password satisfies all the characteristics. A good password satisfies atleast one characteristic. A weak password does not satify any of the properties.

Input
The first line contains the number of test cases N. The next N lines contain the string to be checked.

Output
The output must contain one of the three words- weak/good/strong based on the input.

Sample Input
2
1337c0d3
libertycity

Sample Output
strong
good

4. You are asked to generate all possible strings of a given length within a range of characters. Also display the number of such possible combinations.

Input
The first line of the input gives the number of test cases T. Each case has one numerical input N which tells the length of the password to be generated. Followed two characters A and B separated by a space in the next line.

Output
Display all possible combinations of characters of the given length separated by a space. And the last line to contain the no of possible passwords.

Limits
$1 \leq N \leq 5$
$a \leq A \leq B \leq z$

Sample Input
2
1
a z
3
p s

Sample Output
q w e r t y u i o p a s d f g h j k l z x c v b n m
26
ppp ppq ppr pps pqp pqq pqr pqs prp prq prr prs psp psq psr pss qpp qpq qpr qps qqp qqq qqr qqs qrp qrq qrr qrs qsp qsq qsr qss rpp rpq rpr rps rqp rqq rqr rqs rrp rrq rrr rrs rsp rsq rsr rss spp spq spr sps sqp sqq sqr sqs srp srq srr srs ssp ssq ssr sss
64

5. Elly has been living on her own for a while now. Every time she washes her clothes some of her socks mysteriously disappear. Because of that the girl has gathered quite a few single socks of various sizes. She wants to match some of them in pairs, possibly using two socks of different sizes as a pair (come on, nobody will notice if you wear a size 36 sock on your left foot and 37 on your right one). She wants to make P pairs in total out of the socks she has. Any two socks can be paired, however Elly does not like to have pairs in which one of the socks is much bigger than the other. Thus, she wants the difference in sizes in the worst pair to be as little as possible. Given the sizes of Elly's socks, and the maximum difference D in the size of socks, find the minimum number of pairs of socks who's difference in sock size is more than D.

Input
The first line of the input gives the number of test cases T. Each case has numerical inputs N and D signifying the size of individual socks and the maximum desired difference. The next line contains N sock sizes separated by a space.

Output
For every test case, display the minimum number of pairs of socks whose difference is more than D.

Sample Input
2
6 2
42 37 84 36 41 42
6 3
2 6 3 9 11 21

Sample Output
1
1

6. Make a simple URL Validator.
([protocol][www.][subdomain.]domain[.extension][/]path[?query])
Valid protocols: http and https
Valid domain extensions: .com, .org and .net
There may/may not be one or more parameters of form:
parameter?=value[&parameter2=value2]..
Even xx.com/?= is also valid
There may be multi-level domains:
subsub.sub.domain.extension
There may be extensions which may have any kind of file ie the extension can be any combination of 3 characters/digits:
../hello/hi.pwz is also considered valid
Valid characters: %, _, -, &, + (allowed in parameters and extensions but not the domain)
Dots are used strictly in domain naming and nowhere else
A file will never have a parameter:
ieee.org/abstract42.pdf?life=42 is invalid

Input
The first line contains the number of test cases T. The next T lines contain a string whose

validity needs to be tested.

Output
Validity of the URL: true or false

Sample Input
4
abcd.com/en-us/in/md5_checksum/u/incode/?=this%is_sparta?
https://www.may.d.f4.com/b.w3d?yo=u
https:www.go.d.d.com/dd.htm?=
#.asx

Sample Output
false
true
false
false

Explanation
Case 1:? must always be followed by an '='
Case 4: # is not a valid URL

7. On Unix systems, data is stored in directories. There is a root directory("/"), with several others inside it and so on. For example, "/IEEE/Incode/Round1", where Round1" is a directory in the directory described by "/IEEE/Incode" which in turn is a directory referred by "Incode" described by "/IEEE", which refers to the directory "IEEE" in the root directory. To create a directory, you can use the mkdir command. You specify a path, and then mkdir will create the directory described by that path, but only if the parent directory already exists. For example, if you wanted to create the "/IEEE/Incode/Round1" and "/IEEE/Incode/Round2" directories from scratch, you would need four commands:
mkdir /IEEE
mkdir /IEEE/Incode
mkdir /IEEE/Incode/Round1
mkdir /IEEE/Incode/Round2
Given the full set of directories already existing on your computer, and a set of new directories you want to create if they do not already exist, how many mkdir commands do you need to use?

Input
The first line of the input gives the number of test cases, T. T test cases follow. Each case begins with a line containing two integers N and M, separated by a space. The next N lines each give the path of one directory that already exists on your computer. This list will include every directory already on your computer other than the root directory. (The root directory is on every computer, so there is no need to list it explicitly.) The next M lines each give the path of one directory that you want to create.

Output
For each test case, output one line containing the number of mkdir you need.
Limits
$1 \leq T \leq 100$
$0 \leq N \leq 100$

1 ≤ M ≤ 100

Sample Input
2
0 2
/IEEE/Incode/Round1
/IEEE/Incode/Round2
2 1
/a
/a/b
/a

Sample Output
4
0

8. Initially, there is a polygon with N vertices drawn in the plane. The polygon is strictly convex, i.e., each internal angle is strictly smaller than 180 degrees. The vertices of the polygon are numbered 1 through N, in clockwise order. Two players play the game on this polygon. The players take alternating turns. In each turn, the current player chooses a diagonal of the polygon and draws it as a straight line segment. The player is only allowed to choose a diagonal that does not intersect any of the previously drawn segments (it must not share endpoints with any of them either). The player who cannot draw a diagonal according to the above rules loses the game. You are given the int N. We assume that both players play the game optimally. Return 1 if the first player wins and 2 otherwise.

Input
The first line contains the number of test cases N. The next N lines contain the test cases each having 1 number representing the number of sides of a polygon.

Output
Just one line containing 1 or 2 for each test case

Sample Input
3
3
4
15

Sample Output
1
1
2

9. Given a T9 dialer, you are asked the number of valid n-digit numbers that can be dialed when you are only allowed to move up/down/left/right by one step at a time ie. if you're on 6, you can only move to 3, 5 and 9. A number can be used multiple times times in the sequence of numbers.

T9 dialer:
1 2 3

4 5 6
7 8 9
* 0 #

Input
The first line contains the number of test cases T. The next T lines are the N - the length of the number to be dialed.

Output
Each line contains an integer, the answer.

Sample Input
2
1
2

Sample Output
10
36

10. You are an organizer for Revels and have volunteers under you. You need to pass some important information to them during the time of their classes. Since they all have a lot of bunks, they don't want to bunk classes. Volunteers can inform their friends and so on. Find the minimum number of students you need to meet to inform all the students.

Input
Number of test cases T in the first line. The next line contains two numbers, N - the number of volunteers and E the number of friend relations separated by a space. The next E line contain two numbers A and B which signifies that A is friends with B.

Output
For every test case, one line containing the minimum number of volunteers needed to be called.

Sample Input
2
4 2
0 1
1 2
3 0

Sample Output
2
3

11. Given a 4x4 Sudoku, find its solution. If the solution exists display it, else display the message - "Can not solve an invalid Soduko!". The rules are as follows:

- Each row or column contains a number only once.
- Each block of 2x2 also contains a number only once.

Input

4 lines, each containing 4 numbers - from 1 to 4 inclusive.

Output
The solution of the Sudoku, if it exists. Else the string - “Can not solve an invalid Soduko!”

Sample Input
0 1 3 0
2 0 0 0
0 0 0 3
0 2 1 0

Sample Output
4 1 3 2
2 3 4 1
1 4 2 3
3 2 1 4

12. In a galaxy far far away, there are N days in a week. Luke has N T-shirts which he decides to wear at most once a week, every week. He wants to wear the t-shirts in different order. But he decides to not wear the same t-shirt before D days i.e. if he wears the t-shirt on day x, he can only wear it on or after x+Dth day.
Master Yoda sends him to a battle that lasts for exactly K weeks. But Master Yoda forgets that. All he remembers is the sequence of clothes he wore on the first and the last week.
Given the sequence of clothes for the first and last week and D, the minimum gap between wearing each dress, find the minimum number of weeks the battle lasted.

Input
The first line contains N, the number of weeks followed by the sequence of t-shirts he wears on the first and last week in consecutive lines. The last line contains D, the minimum day gap.

Output
Just one line containing the minimum weeks the battle must have lasted.

Sample Input
4
1 2 3 4
4 3 2 1
3

Sample Output
4

Explanation
week 1: {1,2,3,4}
week 2: {2,3,4,1}
week 3: {3,4,2,1}
week 4: {4,3,2,1}

13. Let P1, P2, … ,PN, … be a sequence of prime numbers. Super-prime number is such a prime number that its current number in prime numbers sequence is a prime number too.

For example, 3 is a super-prime number, but 7 is not.

Input
Two numbers less than 10000 for start and end range.

Output
List of all Super primes in the range

Sample Input
0 9

Sample Output
3 5

14. After solving nice problems about bishops and rooks, Petya decided that he would like to learn to play chess. He started to learn the rules and found out that the most important piece in the game is the king. The king can move to any adjacent cell (there are up to eight such cells). Thus, two kings are in the attacking position, if they are located on the adjacent cells. Of course, the first thing Petya wants to know is the number of ways one can position k kings on a chessboard of size n × n so that no two of them are in the attacking position. Help him!

Input
The first line contains the number of test cases T. The next line contains two integers n ($1 \le n \le 10$) and k ($0 \le k \le n^2$).

Output
For every test case, print a line containing the total number of ways one can put the given number of kings on a chessboard of the given size so that no two of them are in attacking positions.

Sample Input
2
3 2
4 4

Sample Output
16
79

15. Dante is engaged in a fight with "The Savior". Before he can fight it with his sword, he needs to break its shields. He has two guns, Ebony and Ivory, each of them is able to perform any non-negative number of shots.
For every bullet that hits the shield, Ebony deals a units of damage while Ivory deals b units of damage. In order to break the shield Dante has to deal exactly c units of damage. Find out if this is possible.

Input
The first line contains the number of test cases T. The next lines of the input contains three integers a, b, c ($1 \le a, b \le 100$, $1 \le c \le 10\ 000$) — the number of units of damage dealt by Ebony gun and Ivory gun, and the total number of damage required to break the

shield, respectively.

Output
For every test case T, print 'Yes' if Dante can deal exactly c damage to the shield and 'No' otherwise.

Sample Input
3
4 6 15
3 2 7
6 11 6

Sample Output
No
Yes
Yes