THE CODERS CUP

FRESHMEN COMPLIMENTARY ROUND

QUESTION SET

Competition Rules:

Participation Guidelines:

- The Freshmen Coders Cup round spans for 1 hour. If you have completed the problem set before the allocated time, you may leave the competition room quietly, but inform the coordinator must.
- If you leave the room, you cannot return.
- You can discuss only with your team mates. If you discuss with anyone else, both team will be disqualified from the competition.

Submission Guidelines:

- Find sample inputs from net-storage.
- The problem submission will be through PC^2
- Clarifications to any problem can be obtained using PC^2. No in room managers will be responsible for problems/confusions in problem set given.
- You are allowed to use language
    - C, C++, C#.NET, JAVA.
- IDEs allowed are:
    - Bloodshed Dev C++ for C and C++
    - Visual Studio 2008 or 2010 for C#.NET
    - NetBeans 6.8 for JAVA.
- Make console projects for all afore mentioned IDEs.
- Show output on console; don't write on a text file.
- Do not prompt for input from console in the program.
- Remove system ("pause")/getch()/package inclusion statements from your choice before submitting.

Additional Guidelines:

- The solution will be judged by multiple input files and execution time.
- The decision of judge will stand unchallenged.
- Books, manuals, and any sort of guide materials are not allowed.
- Your team can be dis-qualified, if found hard coding for solutions.
- Your team can be dis-qualified, if found using internet.
- Your team can be dis-qualified, if found unfair in anyway.

Note: Save your work continuously, ACM NUCES is not responsible for any loss of work due to power failure or any other reason.

Question 1:

TRANSFORM THE EXPRESSION:

Reverse Polish Notation (RPN) is a mathematical notation where every operator follows all of its operands. For instance, to add three and four, one would write "3 4 +" rather than "3 + 4". If there are multiple operations, the operator is given immediately after its second operand; so the expression written "3 − 4 + 5" would be written "3 4 − 5 +" first subtract 4 from 3, then add 5 to that.

Transform the algebraic expression with brackets into RPN form.

You can assume that for the test cases below only single letters will be used, brackets [] will not be used and each expression has only one RPN form (no expressions like a*b*c).

INPUT:

The first line contains "T", the number of test cases (less than 100).

Followed by "**T**" lines, containing an expression to be translated to RPN form, where the length of the expression is less than 400.

OUTPUT:

The expressions in RPN form, one per line.

Sample:

Input	Output
3 (a+(b*c)) ((a+b)*(z+x)) ((a+t)*((b+(a+c))^(c+d)))	abc*+ ab+zx+* at+bac++cd+^*

Question 2:

BIRTHDAY CANDLES

The ched is preparing a birthday cake for one of his guests, and he decided to write the age of the guest in candles on the cake.

There are 10 types of candles, one for each of the digits '0' through '9'.

The chef has forgotten the age of the guest, however, so doesn't know whether he has enough candles of the right types.

For example, if the guest were 101 years old, the chef would need two '1' candles and one '0' candle.

Given the candles the chef has, your task is to determine the smallest positive integer that cannot be represented with those candles.

INPUT:

Input will begin with an integer "**T**" ≤100, the number of test cases. Each test case consists of a single line with exactly 10 integers, each between 0 and 8, inclusive.

The first integer of each test case represents the number of '0' candles the chef has, the second integer represents the number of '1' candles the chef has, and so on.

OUTPUT:

For each test case, output on a single line the smallest positive integer that cannot be expressed with the given candles.

Sample:

Input	Output
3	4
2 1 1 4 0 6 3 2 2 2	10
0 1 1 1 1 1 1 1 1 1	22
2 2 1 2 1 1 3 1 1 1	

Question 3:

CIEL AND THE RECEIPT

Tomya is a girl. She loves Chef Ciel very much.

Tomya like a positive integer "**P**", and now she wants to get a receipt of Ciel's restaurant whose total price is exactly "**P**".

The current menus of Ciel's restaurant are shown the following table:

Name of Menu	price
eel flavored water	1
deep-fried eel bones	2
clear soup made with eel livers	4
grilled eel livers served with grated radish	8
savory egg custard with eel	16
eel fried rice (S)	32
eel fried rice (L)	64
grilled eel wrapped in cooked egg	128
eel curry rice	256
grilled eel over rice	512
deluxe grilled eel over rice	1024
eel full-course	2048

Since Tomya is a pretty girl, she cannot eat a lot.

So please find the minimum number of menus whose total price is exactly "**P**".

Note that if she orders the same menu twice, then it is considered as two menus are ordered.

INPUT:

The first line contains an integer "**T**", that is the number of test cases.

Then "**T**" test cases follow. Each test case contains an integer "**P**".

OUTPUT:

For each test case, print the minimum number of menus whose total price is exactly "**P**".

CONSTRAINTS

$1 \le T \le 5$

$1 \le P \le 100000$ (105)

There exists a combination of menus whose total price is exactly "**P**".

Input	Output
4	2
10	1
256	8
255	2
4096	

Question 4:

SANDY THE THIEF

Spongebob and patrick love to play with their toys. One of their favorite games is catch and throw.
They play their favorite game with numerous multi-colored balls they have in different shapes and sizes. Each ball is also uniquely numbered. The balls are placed on two separate shelves. One shelf contains all the balls with prime numbers and the other shelf contains all the composite numbered balls.

However, sandy doesn't like their game. She is always stealing their balls so that they can play something else besides catch and throw. Once again, this time sandy has succeeded in her mission.

Spongebob and Patrick are very angry because they cannot figure out which of their balls are missing. It seems like many balls from the prime number shelf are missing but in order to be completely sure you need to check each and every ball. So help them and find the different balls; however you need to follow some rules.

- If it is a prime numbered ball then simply display its position
- If it is a composite numbered ball then display the nearest prime numbered ball before it, and also the difference b\w the two balls. (i.e. between the given composite numbered ball and the prime numbered ball nearest to it from backwards.)

INPUT:

The first line contains an integer “T”, the number of test cases. Then “T” test cases follow. Each test case contains an integer “P”.

OUTPUT:

For each output print the prime number and its position or difference.

Input	Output
4 23 20 10 7	23 9 19 4 7 3