TRIATHALON ONLINE PRELIMS

Rules:

1: To be done in teams of maximum three members.

2: Plagiarism is a good word to know and bad act to own. Pleaseavoid sharing your answers with other teams.

3: For submissions, please mail your answers to triathalon@shaastra.org as a single zip file. The answers to the logic round should be in a pdf file named logic.

4: The answers to the other two parts should be in a folder named Alogorithms and Web Development respectively. The solution to each problem should be further be inside a folder named after the number of the question.

5: Any solution not submitted in this format will not be accepted.

6: Deadline for submission is December 20.

LOGIC ROUND:

1) Sum of two quantities (positive real numbers) is 3n. Find the probability that product of these two quantities is not greater than 4/5th of the greatest product.

2) John: I have three kids.
   Joe: How old are they?
   John: The product of their ages is 72. Sum of their ages is same as your birthdate.Myyoungest baby still don’t go to school.
   Joe: Now I got it!

   How old are John’s kids. How did Joe find that?

3) Here's a series for you!
Find out the missing number

2, 8, 3, 7, 7, 3, 16,?.

Explain the logic used, briefly.

4) What comes next? (Simple Logic-Don't think too much)
ACF, DGI, HNP, MSW,? .
- SUW
- JAZ
- IKA
- PDA

5) CAR RACE

This is entirely different from normal race.
RULES: 1.Two participants and
2.The one, whose car comes last, wins the race.

Ram and Rahim didn't start the race for two hours. Both of them waiting for others to start. They wanted to show their **mettle**but the rules are entirely different. Then they came up with an idea and the race was completed within 30 minutes. What might be the idea? (There are many possibilities. Submit the best and most relevant you can think of.)

6) You are given a 14lit jar full of water and you have 8lit and 3lit empty jars. Now you have two split them into two equal halves using only these jars and nothing else. How would you do it?

ALGORITHMS AND DATA STRUCTURES:

1.Design an algorithm to flatten a binary tree into a linked list, breadth-first. Implement this with constant storage.

2. SELECTING TEAMS

For an upcoming programming contest, Roy is forming some teams from the n students of his university. A team can have any number of contestants.
Roy knows the skill level of each contestant. To make the teams work as a unit, he should ensure that there is no skill gap between the contestants of the same team. In other words, if the skill level of a contestant is x, then he has either the lowest skill level in his team or there exists another contestant with skill level of $x-1$ in the same team. Also, no two contestants of the same team should have same skill level. Note that, some of the contestants always write buggy codes, their skill levels are negative.
It is clear that more the number of contestants in a team, more the problems they can attempt at a time. So Roy wants to form teams such that the **size of the smallest possible team** is maximized.

Input Format

The first line of input contains t ($1 \le t \le 100$), the number of test cases.
Each case contains an integer n ($0 \le n \le 105$), the number of contestants, followed by n space separated integers. The i th integer denotes the skill level of i th contestant. The absolute values of skill levels will not exceed 109.
The total number of contestants in all cases will not exceed 106.

Output Format

For each test case, print the output in a separate line.

Sample Input

```
4
7 4 5 2 3 -4 -3 -5
1 -4
4 3 2 3 1
7 1 -2 -3 -4 2 0 -1
```

Sample Output

```
3
1
1
7
```

Explanation

For the first case, Roy can form two teams: one with contestants with skill levels{-4,-3,-5} and the other one with {4,5,2,3}. The first group containing 3members is the smallest.
In the second case, the only team is {-4}
In the third case, the teams are {3} , {1,2,3}, the size of the smaller group being 1.
In the last case, you can build a group containing all the contestants. The size of the group equals the total number of contestants.

3. POWER CODE:

The longer the code, the stronger the code. The power number (**P**) of a code determines the strength of a code.
While computing the power number of a code we should ignore the keywords in the code. A few sample key words would be *int, unsigned, string, etc*. The power of a code can be determined by the number of characters in the code that **do not** belong to any of the keywords.
More formally, for each keyword **K**, consider all the occurrences of **K** in the code, ignore all these matching substrings while computing the power. See the example for clarity.

Example:

If you take a code to be
int main() { mlinteger a; return 0; }
The above code has **37** characters in total.
If the key words are
int return lint integer
Then the power of the above code would be **20**, **spaces need to be counted**:
" main() { " --> 10 "m a; " --> 5 " 0; }" --> 5
The codes can be concatenated to be made more powerful. If we have two codes **C1**, **C2**with power **P1**, **P2**, the power of code **C1** C2∗∗(here∗∗ denotes concatenation) will be **P1 + P2**.
While concatenating two codes, a **%** character gets inseted in between the two codes. For example if **C1** was print 5; and **C2** was print 6;, **C1 $ C2** = print 5;%print 6;
You are given **N** codes, **K** keywords, you can use each code as many number of times as you want. You are to output the largest power **X**, that can't be attained by concatinating the codes.

Note:

All the following operations are possible.

1. Two same codes can be concatenated with each other.
2. Some codes need not be used in the concatenation.
3. Each code can be used any number of times.

Input Format

First line contains **N**. In the following **N** lines, the **i**th line represents the code **Ci**. The following line contains **K** the number of keywords. The following K lines one keyword each.

Output Format

Print a single line containing **X** as described above.

Constraints

1 <= N <= 10 1 <= |C_i| <= 100000 1 <= K <= 100 1 <= each keyword length <= 1000

Note:

4. Key words do not contain spaces. Both the code and the key words do not contain**%** character. They can contain any other ASCII character.
5. If the answer is infinite then print **-1**.

Sample Input: #1

5 lint maint lllint int maint lllintl lint maint lllint lint maint lllint lint maint lllint 2 int lint

Sample Output: #1

29

Sample Input: #2

3 ababaac babab abcbab 1 bab

Sample Output: #2

5

4. DIGITAL OCEAN

Mr. X is now very popular. But he feels that being popular isn't as good as he thought. He wants to return to his old way. In order to do that, he moved to a less popular language than his usual language(don't worry, it's still a popular language). Mr. X doesn't have the power of STL anymore, but he takes that as a challenge. He wants to do his infamous 2-3-3-3 function in C now.

Since Mr. X also wants to make other people forget him, the function must be so simple that it's forgettable. He only wants you to do a single statement in the function. The statement must also not contain the letter 'x'.

Mr. X has given you his code for you to edit, but you can only edit a certain part of the code.

```
#include <stdio.h>

    int count(int x){

    return edit this part;

    }

    int   main(i){for(i=1;i%1000001;i++)printf("%d   %d\n",i,count(i));return
    0;}
```

Mr. X will first check the correctness of the output. If the output is correct, he then will check the code. If there is anything that violates the rule above, the result will be "compilation error". Changing the code other than the allowed part may also result in a compile error.

DO NOT USE ANY WHITESPACE ON THE EDITED PART

Input : No Input

Output:

1 2

2 3

3 3

4 3

.....

.....

999998 3

999999 3

1000000 3

5. FUN PROBLEM:

A basket ball coach is preparing a team. Every place in the team is filled except one. He has been searching for a boy to fill that place. Luckily

or Unluckily , his assistant finds four brothers whose basket ball playing skills are strikingly same. He informs the coach about them.The coach has never seen the four boys, but he has faith on his assistant,and therfore contacts the boys' parents,and tells them that he would recruit the tallest of the four .But the parents were afraid that ,such a decision would rise conflict among the brothers. So they told the coach that they would send the boys one by one out of the house,and the coach should decide whether to take or not to take the boy at the spot and once a boy passed without getting selected coach cannot recruit him.Assuming that the coach implemented his best strategy,what is the probability that he chooses the tallest boy?

WEB DEVELOPMENT:

1)Basic Design:

a) Design a Square block of any reasonable size and to the left, there should be four buttons named with color names(Red, Blue, Green, and Yellow). Initially the color of the block must be white and by clicking on the button the block must change into the respective color.

b) Below the square block, there must be an input box for text and a submit button immediately. Clicking the submit button should make the text appear inside the square box.

2) Come up with an intuitive design for the home page of a business which deals with selling electronic goods. It should also provide the informative links.

The solution will be mainly judged on:
a) Relevance to design to the topic of interest
b) Good use of design elements.