TI-Concours 2016

Qualifications, 2nd catégoriy
(Nspire Lua and eZ80 Asm/C)

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Before starting

This is a qualification round, which means that you have until 02.08.2016 11:59 p.m. (UTC + 1) to send your production at info@tiplanet.org. Please put the category (Category 2) in the title, and your first name, last name and complete mailing address. Do not forget to attach your production, which has be sent as a ZIP or RAR archive, whose name is your last name in capital letters without accents, followed by a space and the characters "2Q". This archive will contain all the programs you have made (and nothing else).

If you will to participate in both categories, please send us two separate emails. You can update your production as many times as you like, by sending a new e-mail. For each category, we will judge the last production received in time.

For this qualification round, you will have for each question to write a program, whose name will be: the first 5 letters of your last name, all attached and without accent, followed by the characters "1Q" and question number. For example, if your last name is De Périgny, for Question 4 your program will be named "DEPER1Q4". By doing so, you limit the risk that two distinct programs have the same name. If despite this you realize that someone else whose first five letters of the name are the same as yours is involved in the contest, do not worry, we'll take care of the problem.

All programs must be written either in Nspire Lua and / or Nspire-Basic or in eZ80 Asm / C. Be careful in the last case it is indeed the source codes you have to give us, not executables.

Make sure you have a cable for connection between your calculator and your computer, and the appropriate transfer software. If you have trouble with that, feel free to ask questions on http://tiplanet.org.

Unless you are explicitely told to, you will never have to ask for an input or display anything on the output. The subject will give you variable names, will tell you what each of them represents, and your programs will run under the hypothesis that these variables have been initialized correctly beforehand. Similarly, we will always specify which variables will hold the result sought. You have the right to change the variables used in this entry through your programs, and it is assumed that they are never incorrectly initialized.

The precise scale will not be disclosed, but keep in mind that about half of your score will focus on the accuracy of the results produced, and that the second half will focus on the effectiveness of the implemented algorithms. If you have finished before the deadline, you can always try to make your programs run faster.

The difficulty is growing globally, and it is not necessary to do everything to qualify for the final round. We encourage you to submit what you've done, whatever the number of questions dealt with. Whatever happens, we hope you will have fun searching for answers!

Good luck to everyone !

The national sport

In the Republique Complètement Tarée (or RCT) leaders have often had quite specific requirements with respect to their people. The newly elected government, for example, has an immoderate passion for rugby, and fully intends to inflict his attraction to the oval ball to the population.

Question 1

It is assumed that after a rugby match, team 1 got A points, and team 2 has got B points. Write a program that retrieves the values of the variables A and B and affects as value to the variable C 1 if team 1 wins, 2 if team 2 wins, 0 if there is a draw.

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Taking advantage of the wealth amassed by the state over time, the government decided, shortly after taking office, to create a commission to issue deep reflection on the future of the sport if it were to become rooted in the national tradition.

Following this decision, this panel of experts drew up a report entitled "Modern rugby Theory" in which he proposed a generalization of the sports currently played. According to this publication, rugby is a "multiple rating levels sport", in which several types of game events are rewarded with a precise scale. Thus, in the particular case of rugby, we have the following levels:

1) Penalty : 3 points;
2) Drop : 3 points;
3) Try : 5 points;
4) Converted try : 7 points.

Impressed by this discovery, the government members are trying to determine what scale would lead to the most exciting game. They also want to ensure that there are a lot of achievable scores in a game.

Question 2

It is assumed that the L_1 list contains the list of levels in any order. Thus, in the previous example we could have $L_1 = \{3,5,3,7\}$. Write a program that retrieves the list L1 and affects the variable R the value 1 if all scores are possible, the value 0 otherwise.

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In order for everyone to take advantage of this breakthrough, the government decided to make mandatory the practice of rugby. At the same time he created a membership card enabling everyone to be pointed to the drives, and to ensure that everyone comes to the training sessions. This card has to be retrieved at the prefecture by everybody : queuing may tale several hours !

You too, you have to go and get it!

Question 3

You know that the office opens H hours after the start of the day, and that the L1 list contains the number of minutes before people will be waiting, in the order of arrival. Thus, the first person arrives L1(1) minutes after the start of the day, and so on. Write a program that determines after how many minutes you should arrive to wait the shortest possible time, knowing that each person takes 5 minutes to get his card, and stores the result in R (we do not count the seconds). Since you are polite, you let people arriving at the same time as you queuing first.

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Because of the very long waiting time, more offices were opened in each prefecture. There are thus M in the your. But the problem is that the secretaries in charge of an office are not all well trained: This means that all can not serve someone every 5 minutes. Now, assume that the secretary i needs L2(i) minutes for each customer that passes.

The organization is as follows: at the beginning, the first will come to the office 1, the second goes to the office 2, and so on for the first M people. Once an office is vacant, the first person in the queue goes to this office. If multiple offices are vacant at the same time, the first rule applies.

Question 4

Write a program that retrieves lists L1 and L2 as well as the content of the variable N, and stores in variable B the number of the office that will serve you, knowing that you are the Nth person to wait. It is assumed that there is always someone who stands in line.

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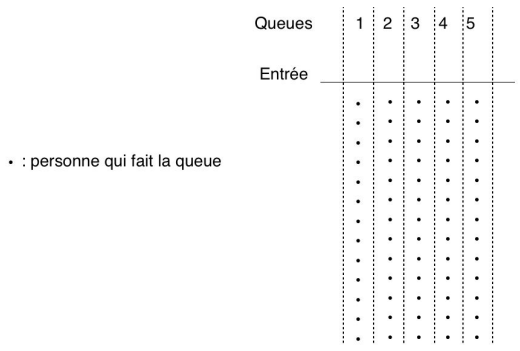
The new measure ends up being applied without too much concern. But government members detect another problem: the lack of attendance in the stadiums. They decide to oblige every citizen to attend at least one game per month. It has the effect of bonder stages, especially in the professional divisions ... however, we need to queue for a long time to access the bleachers!

In the RCT, licensed stadiums satisfy a set of somewhat special rules. Thus, there is only one entrance, and spectators are lining several files before submitting tickets and be searched. There are no barriers between the different files: thus, in making do well, you can go from one queue to another.



With your natural perspicacity you notice that some spectators come in a group or family, and they all go together on the same line. So some files can advance very quickly at once. You decide to take the opportunity to try to double the people and reduce your waiting time. But, given the susceptibility of people, you want to train to double without upsetting anyone.

Question 5

Make a mini game provideing specific training to this situation. In other words, the player will embody a character finding himself at the end of the queue to enter the stadium, and it must be able to change lanes when he wants, in order to enter as soon as possible in the stadium without ever colliding with anyone. You can modify the length of queues and their number. It may also indicate in a way that the spectators came in groups. **The gameplay and graphics quality achieved will be taken into account in the rating.**

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As rugby is not your favorite sport (petanque is less tiring), you try to win matches as quickly as possible, that is to say, after a minimum number of actions. The problem is that your coach sets goals at the beginning of each meeting, and your team is obliged to get a number of points greater than or equal to that goal!

Question 6

It is assumed that the L1 list contains the list of levels in any order. Write a program that retrieves the list L1 and stores in the variable R the minimum number of actions to be performed to achieve the initial goal.

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THE END

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