Tasks of the third stage of the Logia17 contest

- the subject IT competition

for junior high school students of the Mazowieckie Voivodeship

March 9, 2017

Task 1 (letter).

Write a one-parameter letter function whose parameter is a non-empty list of compound words made of small letters of the Latin alphabet. The result of the function is the letter that occurs most often. if more than one letter, the result of the function is an ordered list of letters having that property.

Examples:

in Logo - *the* result of the letter [ala ma kota] is "a, the result of the letter [julka likes dogs] is [lu],
in Python - *the* result of the letter (['ala', 'ma', 'cat']) is' a ', the result of the letter ([' julka ',' likes', 'psy']) is ['l', 'u '].

Task 2 (abc).

John prepared a necklace for Małgosia. Małgosia asked him to remove some beads, that all the blue beads were before red and green, and all the red ones - before the green ones. Other beads can be found in any places.

Write a one-parameter abc function, which results in the minimum number of beads to remove. The parameter of the function is a non-empty word composed of small letters of the Latin alphabet describing the colors next beads in the original necklace. The following characters mean colors: n - blue, c - red, with - green, and other colors are assigned to other letters. The number of beads is no more than 10,000.

Examples:

in Logo - *the* result of abc "nncnnbffbbbccczzzcz is 2 (just remove the third and penultimate bead),
the result of abc "zzzznnnnz is 4 (all you need to do is remove all the blue beads),
in Python - *the* result of abc ('nncnnbffbbbccczzzcz') is 2 (it is enough to remove the third and penultimate bead),
the result of abc ('zzzznnnnz') is 4 (all blue beads are removed).

Task 3 (planet).

On a certain planet, houses have addresses that are pairs of positive integers - their coordinates. The size of the planet is the maximum possible coordinate value. On the size N planet is N x N addresses, from (1, 1) to (N, N).

You can move around the planet only in the north-south and east-west directions (not diagonally), also over and over again. The distance between houses is the sum of the minimum coordinate differences. For example, for a size 10 planet, the house with the address (6, 7) is separated from the house with the address (7, 9) by 1 + 2 = 3, and the house with the address (1, 4) is separated from the house with the address (8, 9) by 3 + 5 = 8, not 7 + 5 = 12.

We distinguish housing estates on the planet, i.e. disjoint sets of houses. Estates may consist of one or more houses. The house belongs to the estate when its distance from a certain house of this estate is no greater than 5. If the distance from a given house to each other on the planet is greater than 5, then that the house is a one-house housing estate.

Write a two-parameter function of the planet whose first parameter is the size of the planet and the second list of house addresses. The result is the number of houses in the housing estate consisting of the largest number of houses. There are at least two houses on the planet and no more than 5,000. The size of the planet is no less than 2 and no more than 5000. House addresses are not repeated.

Examples:

in Logo - *the* result of the planet 12 [[3 1] [1 1] [1 3] [2 12] [9 5] [8 6]] is 4,
the result of the planet 100 [[6 6] [6 11] [11 6] [11 11] [80 80]] is 4,
in Python - *the* result of the planet (12, [[3,1], [1,1], [1,3], [2,12], [9,5], [8,6]]) is 4,
the result of the planet (100, [[6,6], [6,11], [11,6], [11,11], [80,80]]) is 4.

Task 4 (competition).

Competitors (at least two, at most twenty six) before the start receive

identifiers denoted by consecutive capital letters of the Latin alphabet (A, B, C, ..., etc.), of which they do not change during the competition. The competition consists of subsequent rounds. The sequence of players in the next the rounds are kept, but the players are losing. After each round, the player who is in the match drops out round scored the least points. The results of each round are recorded in the list containing the number of points obtained by next players in this round (we assume that each player has a different number of points).

Write a single parameter competition function, the parameter of which is a correct list describing the course competition, ie the list of results of subsequent rounds. The result of the function is a letter denoting a player who he won, meaning he won the last round.

Examples:

in Logo - the result of the competition [[8 9]] is "B, the result of the competition [[4 0 2 1] [1 2 3] [2 1]]
is "C (after the first round busted player B, after the second A, and the last was better C than D),
in Python - the result of the competition ([[8,9]]) is 'B', the result of the competition ([[4,0,2,1], [1,2,3], [2,1]])
is 'C' (after the first round B was eliminated, after the second A, in the last round C was better than D).