Knowledge Evaluation C/C++, C#

Name: ____

Date: _____/_____/_____

- You have **180 minutes** to complete the test.
- Your answers should be given in the language specified in each problem. The code provided in the response must compile and run.
- Each problem provides a code model in the specified language with a generic implementation of input and output, as well as a function that should implement the solution of the problem.
- Write your comments in English.
- Write down your assumptions whenever necessary for better understanding.

Good luck.

Problem #1

Convert a currency numeric amount into words (in Portuguese), as shown below:

1.000.080,00	Um milhão e oitenta reais
111,00	Cento e onze reais
1,11	Um real e onze centavos
23,01	Vinte e três reais e um centavo
1.000,01	Mil reais e um centavo

Function Description

Implement using C++ the *convertAmount2Words* function. It should convert currency numeric amount into words (in Portuguese).

Input Format

Parameters:

- *m*: an integer representing the reais, $0 <= m < 10^9$
- *n*: an integer representing the cents, $0 <= n < 100$

Output Format

Print the amount in words.

Sample Input 1

```
1000080
0
```

Sample Output 1

```
Um milhão e oitenta reais
```

Sample Input 2

```
111
11
```

Sample Output 2

```
Cento e onze reais e onze centavos
```

Problem #2

A robot walks in 2d space, like a chess board. It is instructed to perform his movements using the following commands:

- U: up -> move to one position up
- D: down -> move to one position down
- L: left -> move to one position to the left
- R: right -> move to one position to the right

Each movement has the same measure, going from one position to another on the board

Identify the last time when the robot returned to a point where it has already been, closing a loop. Print the sequence of commands the robot executed from the first time it reached that position until it reached that same position again.

Function Description

Implement using C++ the function *getLastLoop*. This implementation should have the order of complexity O(n)

Input Format

Parameter: A string with the commands

Output Format
A string with the command to close the last loop.

Sample Input 1

```
RRRRDDDLLUUUUUUURRD
```

Sample Output 1

```
RRRDDDLLUUU
```

Board, path in green:

The position represents the current location after the command is executed.

		U	R	R
		U		D - FINISH
		U		
		U		
START	R	R (first pass) U (second pass)	R	R
		U		D
		U		D
		L	L	D

Sample Input 2

```
RRRRDDDLLUUUUUUURRDDDDR
```

Sample Output 2

```
RDDDLLUUUUUUURRDDDD
```

Board, path in green:

The position represents the current location after the command is executed.

		U	R	R	
		U		D	
		U		D	
		U		D	
START	R	R (first pass) U (second pass)	R	R (first pass) D (second pass)	R - FINISH
		U		D	
		U		D	
		L	L	D	

Problem #3

A palindrome is a string that is the same forwards and backwards. Write a function to verify if a string is a permutation (rearrangement) of a palindrome.

Function Description

Implement using C# the function isPalindromePermutation. It should return “YES” when the string is a permutation of a palindrome, or “NO” when it is not. This implementation should have the order of complexity O(n)

Input Format
Parameter: A valid string.

Output Format
It should return “YES” when the string is a permutation of a palindrome, or “NO” when it is not.

Sample Input 1

```
carroaco
```

Sample Output 1

```
YES
```

Sample Input 2

```
abcabcabc
```

Sample Output 2

```
NO
```

Problem #4

In Brazil, there are coins with face value 1, 5, 10, 20, 25 and 50 cents. Assuming there are available coins to you in infinite quantities, the proposed problem is to calculate the number of ways to compose a given amount (combination of coins).

Function Description

Implement using C# the function getNumberOfCombinations to calculate the number of ways to compose a given amount with the available coins.

Input Format
Parameter: Amount in number of cents (integer)

Output Format
Number of combinations (integer)

Sample Input 1

```
10
```

Sample Output 1

```
4
```

Sample Input 2

```
20
```

Sample Output 2

```
10
```