

Exercise paper#1

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1 Exercise 1

Let's start with something simple just to stretch our neurons. This is an output prediction exercise. In this kind of exercises you have not to write code but you have to think about the output of a given program without executing it with a computer.

So, given the following program written in C++ programming language, predict the output.

```
int main(){
    int vet[10]={ 5, 6, 44, -11, 3, 5, 66, -1, -11, 3 };
    cout<<"Output 1:"<<endl;
    cout<<vet[4]<<endl;

    cout<<"Output 2:"<<endl;
    for(int i=3; i<10; i=i+2){
        cout<<vet[i]<<" - ";
    }
    cout<<endl;

    cout<<"Output 3:"<<endl;
    cout<<vet[0]+vet[8]<<endl;

    return 0;
}
```

2 Exercise 2

Carlo Rossi has been recently employed by Amazon as a courier. He has to deliver an Amazon box in a small village, "Romallo". Unfortunately the home number is missing due to unknown reasons. Carlo decides to carefully analyze data about Romallo, and in a document he has found a list of the existing Amazon's clients who live in Romallo. Here is the list of home numbers of these people:

3 4 1 2 13 24 12 11 20 35 32 31

Houses identified with odd numbers are located on the left side of the street whereas even numbers are located on the right side of the street. Write an algorithm which helps Carlo to decide whether to leave the box on the left side or on the right side of the street. You could for example count how many even and how many odd numbers are there in the list. If the number of even values is greater than the number of odd values it is more probable that the box has to be delivered on the right side of the street, and vice versa.

3 Exercise 3

Elisa is playing with an application downloaded for her smartphone. The game is really simple: there is a word on the screen and you have to say if the given word is palindrome or not.

Examples:

otto - YES mongolfiera - NO anna - YES radar - YES enrico - NO

Elisa wants to reach the top of the leader board. In order to achieve this purpose she has to answer as quick as possible. Your aim is to help Elisa to win the challenge. Write a C++ program that given a word as an array of characters (char) displays "YES" if the word is palindrome and "NO" otherwise.

Example: char parola[4] = {'o','t','t','o'};

output: YES

4 Exercise 4

You have just been engaged by the secret services of Novella. They found a PC belonging to a very dangerous terrorist who lives in Rumo. This person threatened to burn all the apple fields of Val di Non. Maybe if we are able to access his computer the police might be able to find something helpful. The password of the computer is written in one of the square of a square matrix like the followings:

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 31 & 22 & 21 \end{bmatrix}$$

Your task is to write a C++ program which lists all the possible passwords, or in other words, all the possible squares of a given matrix of integers. Look at these examples to better understand the context:

Input:

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 31 & 22 & 21 \end{bmatrix}$$

Output:

Password1: 1 2 3 1 21 22 31 3

Password2: 2

Input:

$$\begin{bmatrix} 1 & 2 & 3 & 5 & 50 & 20 \\ 3 & 2 & 1 & 91 & 51 & 220 \\ 31 & 22 & 21 & 100 & 52 & 2250 \\ 3 & 12 & 121 & 44 & 53 & 2450 \\ 21 & 112 & 5 & 4 & 9 & 1 \\ 134 & 299 & 39 & 59 & 509 & 0 \end{bmatrix}$$

Output:

Password1: 1 2 3 5 50 20 220 2250 2450 1 0 509 59 39 299 134 21 3 31 3

Password2: 2 1 91 51 52 53 9 4 5 112 12 22

Password3: 21 100 44 121