PROGRAMAÇÃO I

ENGENHARIA INFORMÁTICA

Sheet 3 – Control Structures: Repetition

(while // do...while // for)

1. Write a program that requests to the user a positive integer number and calculate the sum of all numbers up to the introduced number. The result shall appear three times in the monitor, using for that the three known cycles:

```
while (…) {…}
do {…} while (…)
for (…; …; …) {…}
```

   The program should validate the integer number introduced by the user, assuring that it is a positive number.

2. Change the previous program so that the user selects only one of the cycles to make the sum of the numbers up to the previously introduced number.
   This procedure should be repeated until the user wants to exit the program, the following menu options should be presented.

```
(W) ciclo while
(D) ciclo do...while
(F) ciclo for
(S) sair
      OPTION ->
```

3. Develop a program that requests to the user a sequence of integer numbers until the value zero be introduced. The program should calculate the sum and the average of the introduced sequence and present on the monitor the quantity and the percentage of positive and negative numbers existing in that sequence.

4. Change the previous program so that the user may indicate the number of elements of the sequence to be introduced.

5. Develop a program that obtains the values of m and n and calculate the following summation:

$$\sum_{i=m}^{n} \frac{2i}{5+i^2}$$

   The program must ensure that the values of **m** and **n** are positives and that **n**>**m**.

6. Develop a program that requests to the user an integer number and that presents the following menu options:

```
*************************** Main Menu ************************
Number: **                                  Operations performed: **
I - Increments
D - Decrements
Z - Zero
E - End
            Option-->
```

Each time the user selects an invalid option (not available on the menu) should be presented an error message and the option must be requested again.

When the user selects the **'E'** option, the program should end.

The options **'I'** and **'D'** increments and decrements one unit to the integer number inserted, and the **'Z'** option puts the number to zero.

7. Develop a program that obtains a positive integer number and calculate the sum of its digits. For example, to the number 752 the sum of its digits is 14 (7+5+2).

   Tip: The digits of a number are obtained by performing successive divisions by 10.

8. Consider the following program:

```
int main(void){
  int i,j;
  for(i=0;i<3;i++) {
    for(j=0;j<6;j++) {
      if(i==j) {
         printf("A");
      }
      else{
         printf("O");
      }
    }
    printf("\n");
  }
  return 0;
}
```

   a) What is the result of the program execution?

   b) Modify the program in a way to obtain the following output:

AOOOO

OAOO

OOA

OO

O