




## 5. Lab

### Loops (for and while) and conditional statements (if and switch)

-  First, see in the lectures' part of the Laboratory manual (polycopié des TPs), the counterpart chapter of this Lab.

#### 5

1. Evaluate the following expressions without using Matlab. Check your answers with Matlab :
  - (a)  $14 > 15/3$
  - (b)  $y = 8/2 < 5 \times 3 + 1 > 9$
  - (c)  $y = 8/(2 < 5) \times 3 + (1 > 9)$
  - (d)  $2 + 4 \times 3 \sim = 60/4 - 1$
2. Given :  $a = 4$ ,  $b = 7$ . Evaluate the following expressions without using Matlab. Check your answers with Matlab :
  - (a)  $y = a + b \geq a \times b$
  - (b)  $y = a + (b \geq a) \times b$
  - (c)  $y = b - a < a < a/b$
3. Given :  $v=[4 \ -2 \ -1 \ 5 \ 0 \ 1 \ -3 \ 8 \ 2]$ , and  $w=[0 \ 2 \ 1 \ -1 \ 0 \ -2 \ 4 \ 3 \ 2]$ . Evaluate the following expressions without using Matlab. Check your answers with Matlab :
  - (a)  $v \leq w$
  - (b)  $w = v$
  - (c)  $v < w + v$

(d)  $(v < w) + v$

4. Evaluate the following expressions without using Matlab.

(a) Which of the following represents a correct `if, else` statement?. Why?.

(1)

```

1 a = input('a? ')
2 If a < 0
3 disp('a is negative')
4 ELSEIF a == 0
5 disp('a is equal to zero')
6 Else
7 disp('a is positive')
8 END

```

(2)

```

1 a = input('a? ')
2 if a < 0
3 disp('a is negative')
4 elseif a = 0
5 disp('a is equal to zero')
6 else
7 disp('a is positive')
8 end

```

(3)

```

1 a = input('a? ')
2 if a < 0
3 disp('a is negative')
4 elseif a == 0
5 disp('a is equal to zero')
6 else
7 disp('a is positive')
8 end

```

(4)

```

1 a = input('a? ')
2 if a < 0
3 disp('a is negative')
4 else if a = 0
5 disp('a is equal to zero')
6 else
7 disp('a is positive')
8 end

```

(b) What will the following code give?

(1)

```

1 a = 10;
2 if a ~= 0
3 disp('a is not equal to zero')
4 end

```

(2)

```

1 a = 10;
2 if a > 0
3 disp('a is positive')
4 else
5 disp('a is not positive')
6 end

```

(3)

```

1 a = 5;
2 b = 3;
3 c = 2;
4 if a < b*c
5 disp('Hello world')

```

```

6 else
7 disp('Goodbye world')
8 end

```

- (c) For what values of the variable `a` will the following code display the phrase Hello world?

(1)

```

1 if a >= 0 & a < 7
2 disp('Hello world')
3 else
4 disp('Goodbye world')
5 end

```

(2)

```

1 if a < 7 | a >= 3
2 disp('Hello world')
3 else
4 disp('Goodbye world')
5 end

```

5. Write your own script files to solve the following problems :
- Write a script file that asks the user to enter a number and returns the natural logarithm of the entered number if the number is positive. Otherwise, it displays an error message.
  - The rental cost per kilometer of a rental car is 10 DZD for the first 100 kilometers, 7 DZD for the next 200 kilometers and 5 DZD for all kilometers greater than 300 kilometers. Write a function that determines the total cost for a given number of kilometers ?.
6. How many times will the phrase Hello World be displayed after executing the following code?

(1)

```

1 for a=0:50
2 disp('Hello World')
3 end

```

(2)

```

1 for a=-1:-1:-50
2 disp('Hello World')
3 end

```

(3)

```

1 n = 10;
2 while n > 0
3 disp('Hello World')
4 n = n - 1;
5 end

```

(4)

```

1 n = 1;
2 while n > 0
3 disp('Hello World')
4 n = n + 1;
5 end

```

7. Write your own scripts to perform the following tasks :
- A `for` loop that multiplies all even numbers from 2 to 10.
    - A `while` loop that multiplies all even numbers from 2 to 10.
  - A `for` loop that assigns the values 10, 20, 30, 40 and 50 to a vector.
    - A `while` loop that assigns the values 10, 20, 30, 40 and 50 to a vector.

- iii. Is there a simpler way to do the above task without using loops?.
- (c) Given the vector  $x=[1 \ 8 \ 3 \ 9 \ 0 \ 1]$  :
  - i. Use a `for` loop to add all the elements of the vector  $x$ .
  - ii. Use a `while` loop to add all the elements of the vector  $x$ .
  - iii. Is there a simpler way to do the above task without using loops?.
- (d) The factorial of a non-negative integer is defined as follows :

$$n! = n \cdot (n - 1) \cdot (n - 2) \cdot \dots \cdot 1,$$

Use a `for` loop to calculate and display the factorial of a non-negative integer. You need to ask the user for a non-negative integer and verify that it is indeed non-negative. There is a built-in function called `factorial`. Therefore, you should use a different name for your script to avoid confusion and you can compare your results with that of `factorial`. ■