**Programming Tools for Mathematics**

**Lab Assignment N°3**

**Exercise 1**

1. An object with an initial temperature of T0 that is placed at time t = 0 inside a chamber that has a constant temperature of TS, will experience a temperature change according to the equation: T = TS + (T0 – TS) e-kt ; where T is the temperature of the object at time t, and k is a constant.

A soda can at a temperature of 49°C (was left in the car) is placed inside a refrigerator where the temperature is 3°C.

1. Determine, to the nearest degree, the temperature of the can after three hours. Assume k = 0,45. (Define all the variables, then use a maximum of two MATLAB command lines to compute the temperature)
2. Follow the can temperature at each 20mn for 3hours
3. Follow the can temperature at each 20mn for 3hours for several chamber temperature: 3°, 14° and 20°.
4. Create a vector $x$ of ten elements ranging from π to 10π. y=10:-1:1
	1. Compute the following statement using parenthesis in respect to right precedencies: z=x\*3+y.^4/5.\*x<-x.\*y/8 & 1.

Compare your answer to the MATLAB’s one.

* 1. Compute $f$ defined by : $f\left(x\_{i}\right)=\frac{3x^{2}+5x}{2x+3}$ ,for each element of the vector $x$.
	2. Divide 5 by each element of $f\left(x\_{i}\right), $what is the problem? How to solve it?
1. Construct the truth table for the following expression ((x et y) ou x)et((x ou y)et non y) .

Answer that x and y are logical variables on 4 bits.

1. Create Z, a vector of integer random values, ranging from 17 to 35, that we will use as the daily maximum temperatures (*◦*C) in a city.
Use relational and logical operators to determine the following:
2. The number of days the temperature was above 24 *◦*C.
3. The number of days the temperature was between 18 *◦*C and 27 *◦*C.
4. Replace these elements by 0.

**Exercise 2**

1. Given the arrays A = 1 3 5 7 9 8 4 0 and B= 2 4 6 8, insert B at the third index of A.
2. Given the matrices C=repmat(1 :3,4,2) and B=[2 4 6 8], insert B at the third index of C.
3. Reshape C to obtain 4 rows and 5 columns
4. Create a vector of angles$ θ$ ranging from 0° to 90° and containing 32 elements. Compute sin(2$θ$)+cos(2$θ$).
5. Verify the following equality for each $θ$: cos $θ$ + i sin $θ$ = $e^{iθ}$