

# Introduction to Matlab programming

## Class 5: 'For' loops

1. **Without using a computer**, please predict how many times will the following programs print "Hello World"?:

<b>a)</b> for a = 1:50 disp(num2str(a)); disp('Hello World'); end;	<b>b)</b> for a = 0:50 disp(num2str(a)); disp('Hello World'); end;
<b>c)</b> for a = 1:3:50 disp(num2str(a)); disp('Hello World'); end;	<b>d)</b> for a = 50:-2:-10 disp(num2str(a)); disp('Hello World'); end
<b>e)</b> for a = 10:20 for b = 1:5 disp(num2str(a)); disp(num2str(b)); disp('Hello World'); end end	<b>f)</b> for a = 10:10:50 for b = 0:0.1:1 disp(num2str(a)); disp(num2str(b)); disp('Hello World'); end end;

2. Write a function that calculates and returns the factorial (!) of a number, given as an input argument. As an example, the factorial of 10 is:

$$10! = 10 * 9 * 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1$$

3. Write a function that calculates and returns (output argument) the average value of all the elements in a vector (input argument). **Don't use** the *mean* or *sum* functions but instead a *for* loop. (Hint: remember that the function *length(x)* returns the number of elements in a vector *x*)
4. Modify the previous function to calculate the same average but for 2D and 3D matrices by adding two nested *for* loops. **Don't use** the *mean*, *sum* or *mean2* function. (Hint: remember that the function *size(x)* returns the dimensions of a matrix *x*)
5. Write a function that, given a number *n*, calculates the following mathematical expression:

$$1*2+2*3+3*4+4*5+\dots+(n-1)*n$$

6. Write a function that, given a numeric matrix *M* (input argument), returns the amount of odd elements. Remember that an even number is divisible by 2, while the odd one is not. (Hint: use an *if* statement inside the *for* loop(s); and remember that the function *rem(a,b)* calculates the remainder after the integer division *a/b*)