

School of Mathematics and Statistics  
MAST30013  
Techniques in Operations Research

Semester 1, 2020

Tutorial on Matlab

This tutorial presents a review of basic Matlab functionalities that will be useful in this course. Matlab is an intuitive programming language and throughout this course we will assume that you already have basic knowledge of it (or of any other programming language). If this is not the case, I suggest you spend a couple of hours at the interactive course below:

<https://matlabacademy.mathworks.com/>

**1. Writing a function:** In this course, it will be useful to define our own functions. The basic matlab notation is exemplified below<sup>1</sup>:

Listing 1: Defining a function that returns the maximum of 5 numbers

```
1 function max = mymax(n1, n2, n3, n4, n5)
2 %This function calculates the maximum of the five numbers given as input
3 max = n1;
4 if(n2 > max)
5     max = n2;
6 end
7 if(n3 > max)
8     max = n3;
9 end
10 if(n4 > max)
11     max = n4;
12 end
13 if(n5 > max)
14     max = n5;
15 end
```

- a) Type and call the function from matlab.
- b) Modify the function so that it will return the minimum of the numbers.
- c) Modify the function so that it will return the two numbers yielding the minimum product.

**2. Let  $f(x) = \cos(x)/x$ .**

- a) Create a matlab function for  $f(x)$ .
- b) Create a matlab function for  $f'(x)$ .
- c) Using the two functions above, create a matlab function to return  $f(x)/f'(x)$ .

**3. Let  $f(x, y) = x^2 + 2x + y$**

- a) Create a matlab function for  $f(x, y)$ .
- b) Create a matlab function for  $\nabla f(x)$ .
- c) Create a matlab function for the Hessian of  $f(x)$ .

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<sup>1</sup>From: [https://www.tutorialspoint.com/matlab/matlab\\_functions.htm](https://www.tutorialspoint.com/matlab/matlab_functions.htm)