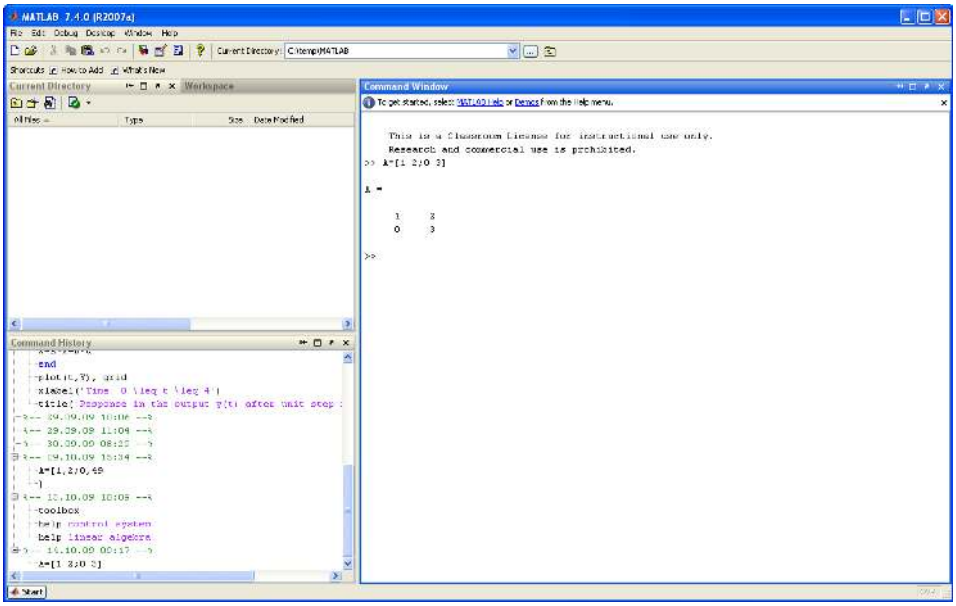
Høgskolen i Telemark

Telemark University College
Department of Electrical Engineering, Information Technology and Cybernetics

Tutorial

Introduction to MATLAB

HANS-PETTER HALVORSEN, 2011.06.06



Preface

MATLAB is a tool for technical computing, computation and visualization in an integrated environment. This document explains the basic concepts in MATLAB.

MATLAB is an abbreviation for MATrix LABoratory, so it is well suited for matrix manipulation and problem solving related to Linear Algebra.

MATLAB offers lots of additional Toolboxes for different areas such as Control Design, Image Processing, Digital Signal Processing, etc.

For more information about MATLAB, see my Blog: **http://home.hit.no/~hansha**

Table of Contents

Preface 2

Table of Contents iii

1 Introduction 1

1.1 Help 2

2 Start using MATLAB 4

2.1 The MATLAB Environment 4

2.1.1 Command Window 4

2.1.2 Command History 5

2.2 Variables 5

2.2.1 Workspace 6

2.2.2 Current Directory 7

2.3 Useful commands 8

3 Matrices and Vectors 9

3.1 Useful commands 11

4 Scripts and functions – M Files 12

4.1 Scripts 12

4.2 Functions 13

5 Flow Control 15

5.1 If-else Statement 15

5.2 Switch and Case Statement 15

5.3 For loop 16

5.4 While loop 16

6 Plotting 17

7 Linear Algebra 19
7.1 Vectors 19
7.2 Matrices 20
7.2.1 Transpose 20
7.2.2 Diagonal 20
7.2.3 Triangular 21
7.2.4 Matrix Multiplication 21
7.2.5 Matrix Addition 22
7.2.6 Determinant 22
7.2.7 Inverse Matrices 23
7.3 Eigenvalues 24
7.4 Solving Linear Equations 24
7.5 LU factorization 26
7.6 The Singular Value Decomposition (SVD) 27
7.7 Commands 27
8 Toolboxes 28
9 Whats Next? 29
Quick Reference 31
9.1 General 31
9.2 Matrices 31
9.3 Linear Algebra 31

1Introduction

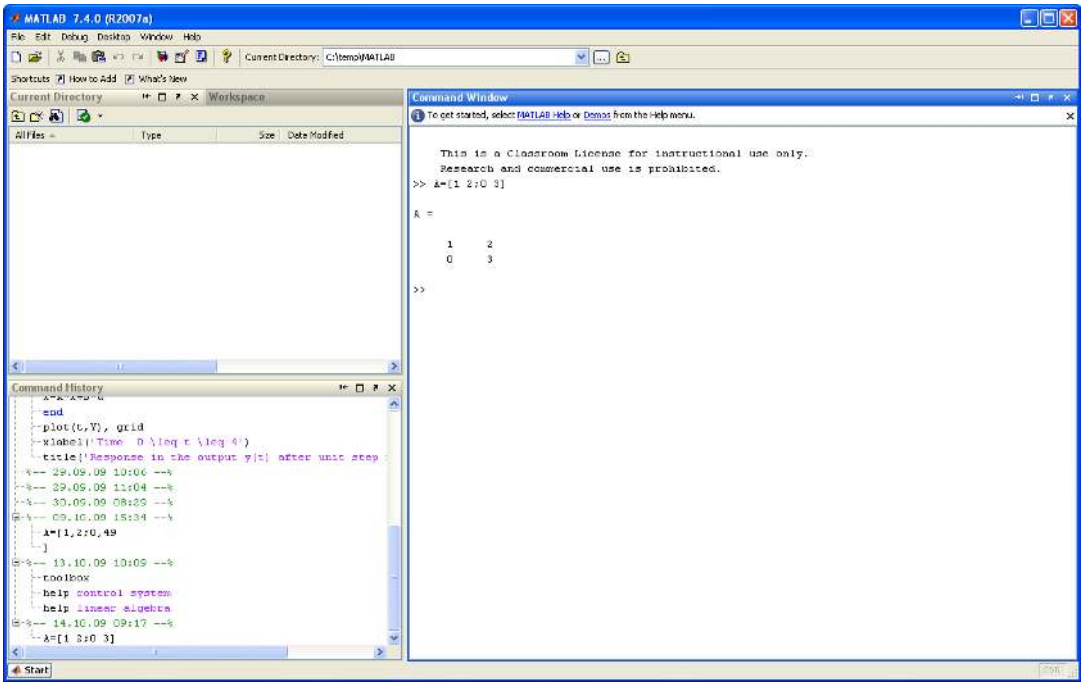
MATLAB is a tool for technical computing, computation and visualization in an integrated environment, e.g.,

- Math and computation
- Algorithm development
- Data acquisition
- Modeling, simulation, and prototyping
- Data analysis, exploration, and visualization
- Scientific and engineering graphics
- Application development, including graphical user interface building

MATLAB is developed by The MathWorks. MATLAB is a short-term for MATrix LABoratory. MATLAB is in use world-wide by researchers and universities.

For more information, see **www.mathworks.com**

Below we see the MATLAB Environment:



MATLAB has the following windows:

- Command Window
- Command History