**Department of Electrical Engineering and   
Computer Science**

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**Semester:** 5th **Section:** BEE 12C

**EE-232: Signals and Systems**

Lab 2: Plotting and Array processing in MATLAB

Group Members

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# Introduction to MATLAB

## Objectives

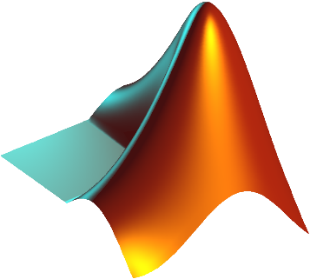
This Lab experiment has been designed to familiarize students with operations on arrays in MATLAB, plotting elementary functions, as well as manipulating plotting interface.

* Familiarization with array specific operators in MATLAB
* How to plot with different styles
* How to handle matrices and vectors in MATLAB

## Equipment

Software

* *MATLAB*



## Lab Instructions

All questions should be answered precisely to get maximum credit. Lab report must ensure following items:

* Lab objectives
* MATLAB codes
* Results (Graphs/Tables) duly commented and discussed
* Conclusion

# Exercise

## Task 1

Draw **x(t) = 2 sin (2πt - π/2)** for 0 ≤ t ≤ 4.

function exercise\_1()

    t = 0:0.01:4;

    x = 2 \* sin(2 \* pi \* t - (pi / 2));

    plot(t, x, '-r');

    grid

    title('Exercise 1')

    xlabel('t')

    ylabel('x = 2 \* sin(2 \* pi \* t - (pi / 2))')

end



## Task 2

Draw graphs of the functions; **[y = cos(x), y = x]**

for 0 ≤ x ≤ 2 in the same window. Use the zoom facility to determine the point of intersection of the two curves (and, hence, the root of x = cos(x)) to two significant figures.

function exercise\_2()

    x = 0:0.001:2;

    y = cos(x);

    hold

    plot(x, y, '-r');

    y = x;

    plot(x, y, '-b');

    grid

    title('Exercise 2')

    xlabel('x')

    ylabel('y = cos(x)')

    legend('cos(x)', 'x');

end



**Intersection:** Zooming to a suitable level, we find the intersection of the two curves to be **0.7391**, which rounded to two significant figures is **0.74**.

## Task 3

**Draw graphs of the functions for x =0:0.1:10 and label your graph properly.**

### y = sin(x)/x

function exercise\_3()

    x = 0:0.1:10;

    y = sin(x) ./ x;

    hold

    plot(x, y, '-r');

    grid

    title('Exercise 3.1')

    xlabel('x')

    ylabel('y = sin(x)/x')

    legend('sin(x)/x');

end



### u = (1/(x-1)2 )+x

function exercise\_3()

    x = 0:0.1:10;

    u = (1 ./ (x - 1).^2) + x;

    hold

    plot(x, u, '-r');

    grid

    title('Exercise 3.2')

    xlabel('x')

    ylabel('u = (1/(x-1)^{2})+x')

    legend('(1/(x-1)^{2})+x');

end



### v = (x2+1)/(x2-4)

function exercise\_3()

    x = 0:0.1:10;

    v = ((x.^2) + 1) ./ ((x.^2) - 4);

    hold

    plot(x, v, '-r');

    grid

    title('Exercise 3.3')

    xlabel('x')

    ylabel('v = (x^{2}+1)/(x^{2}-4)')

    legend('(x^{2}+1)/(x^{2}-4)');

end



### z = ((10-x)1/3-1)/(4 - x2)1/2

function exercise\_3()

    x = 0:0.1:10;

    z = (((10 - x).^(1/3)) - 1) ./ (4 - (x.^2)).^(1/2);

    hold

    plot(x, z, '-r');

    grid

    title('Exercise 3.4')

    xlabel('x')

    ylabel('z = ((10-x)^{1/3}-1)/(4 - x^{2})^{1/2}')

    legend('((10-x)^{1/3}-1)/(4 - x^{2})^{1/2}');

end



# Conclusion

In this lab, we further extended our knowledge of MATLAB and learned array-specific operations. We familiarized ourselves with the syntax of the plot() function; how to add more traces on a same plot window, subplots, etc. We also familiarized ourselves with element wise operations, without which MATLAB will throw an error, as elements of a mat-array are immutable otherwise.