**ENEL101**

**Problem set 4**

**Matlab Plotting**

**Important Notes and Instructions:**

* This assignment is about plotting 2D and 3D graphs in Matlab. Complete this assignment by filling in the template file, assign4.m. As usual, all you need to do is to submit the completed template file.
* As usual assume that all the angles are in radians. The questions are based on content from chapters 5 and 10 of the textbook “Matlab, An introduction with applications”.
* When you open the assign4.m template you will see a form created for each question. This assignment will be semi-auto-marked and the provided template is the form that the instructor has to review to mark your assignment. **Please don’t modify it.**
* The template is designed such that all of the graphing commands, e.g. plot(x,y), xlabel(‘x’), etc. must be written as a string array like graph=’plot(x,y)’. Within this string all single quotes must become double quotes like graph=’plot(x,y);xlabel=(‘’x’’)’.This however does not apply to variables and functions which will be created in the workspace as soon as you run the code.
* To create and see the graph you can use the command eval(graph) (you don’t actually have to do this as it is done for you when you run test\_assign4.m).
* Do not use the figure() command within your Matlab script as this will interfere with the overall plotting program.
* Do not use the axis() command, since the auto-checker will uses random number inputs and the size of the graph will change
* It is essential that you do not deviate from the template as it will make the job of the instructor extremely difficult - and then you will be asked to come and demo your file in person.
* Before you submit your script file, make sure there are no syntax errors.
* Note that instead of a single solution file on D2L there is a list of the solution figures.

An example is provided in the next page.

**EXAMPLE Question 1)**

Given N=1, plot y=N sin(x) for . Use 100 points for your graph. Apply a grid and labels on the abscissa and ordinate of the graph.

In the regular MATLAB command window you would type:

x=linspace(0,10,100);

y=N\*sin(x);

plot(x,y);

grid on;

xlabel(‘x’);

ylabel(‘y’);

However, for the purposes of this assignment you have to create a string that contains all the plotting commands. Within this string all single quotes must become double quotes for it to work:

graph='plot(x,y);grid on;xlabel(''x'');ylabel(''y'')’;

See assign4.m to see how to do Question 1. Run test\_assign4.m to see the plot.

**Q2.** Given N=5, plot the function for . Use 2000 points for your graph. Apply a grid and labels on the abscissa and ordinate of the graph.

**Q3.** Given N=1, Generate a polar plot of . Use 500 points for your graph.

**Q4.** Given N=3, the function is given.

Plot the function for . Label the axis, use a grid and place a title over your plot. Use 30 points for your graph. Limit the y axis of the graph from -12 to +70. Use red dots for the 30 data points and a black \* on the last data point. Enlarge the marker size to ‘10’ pts.

**Q5.** Given N=3, a parametric equation is given by

for a range of t given as . Use subplot() to produce the following two plots. Use 200 points for each graph.

1. In the first subplot and are superimposed, using a solid line for and a dashed line for Provide a legend to tell which line is which function.
2. In the second subplot assume along the abscissa and along the ordinate. Apply a grid and labels on the abscissa and ordinate of the graphs.

**Q6.** An electric circuit that includes a voltage source with an internal resistance and a load resistance is assumed. The power dissipated in the load is given by . Plot the power as a function of for given that and . Use a semilog axis for (i.e. use the semilogx command). Use 20 000 points for your graph. Apply a grid and labels on the abscissa and ordinate of the graphs.

**Q7.** An RLC circuit with an alternating voltage source is assumed. The source voltage is given by , where in which is the driving frequency. The normalized amplitude of the current, , in this circuit is given by

where (), (H), and (F) are the resistance of the resistor, the capacitance of the capacitor, and the inductance of the inductor, respectively. Given (H) and (F) as input arguments use the mesh command to make a 3-D plot of (z-axis) for and for . Label all the axes. Use 200 x 200 points.

**Q8.** An elliptical staircase that decreases in size with height can be modeled by the parametric equations

where

and are the semi-major and semi-minor axes of the ellipse, is the staircase height, and is the number of evolutions that the staircase makes. Given as input arguments generate a 3-D plot of the staircase. Create a vector for the domain 0 to and use the plot3 command.