EGR 141: Plots

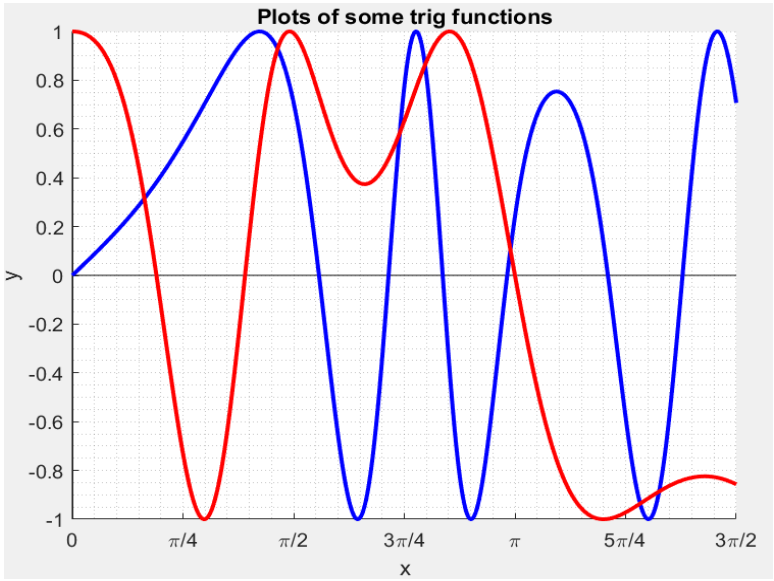
Summary: The goal of this lab is to help understand MATLAB Plots. You should not use any MATLAB commands or concepts that are discussed in future chapters and sections (no loops or if statements yet!)

- Each of the following problems should have a script and, possibly, a function associated with them.
- For each problem, the script file should be called something appropriate, such as *Lab4_1_yourName.m*
- Include any functions that you needed to create in order to complete the problem. Name them whatever is indicated in the problem.
- Inside your script, solve each of the given problems. In between each problem, type *pause;* Clearly indicate where the code for each problem begins by using a comment block. Start each new problem with a *clear .*
- If my example output "lines up nicely" then your output should as well.
- All output statements should output variables, not pre-computed constants. For example, if I ask you to output $r/2$ when $r = 3$, then you should set r to be three then output as *fprintf(' r/2 = %f ',r/2);* and not *fprintf('r/2 =1.5')* or *fprintf(r/2 = %f',3/2)*.
- Do NOT output any variables or data to the screen that is not asked for.
- Note that example output for each problem is not necessarily correct output (I intentionally change numbers so my answers will not always match your answers).

1. Write a MATLAB script that plots the following functions

$$f(t) = \sin\left(\frac{3}{2}te^{-\cos t}\right)$$
$$g(t) = \cos\left(\frac{3}{2}te^{\sin t}\right)$$

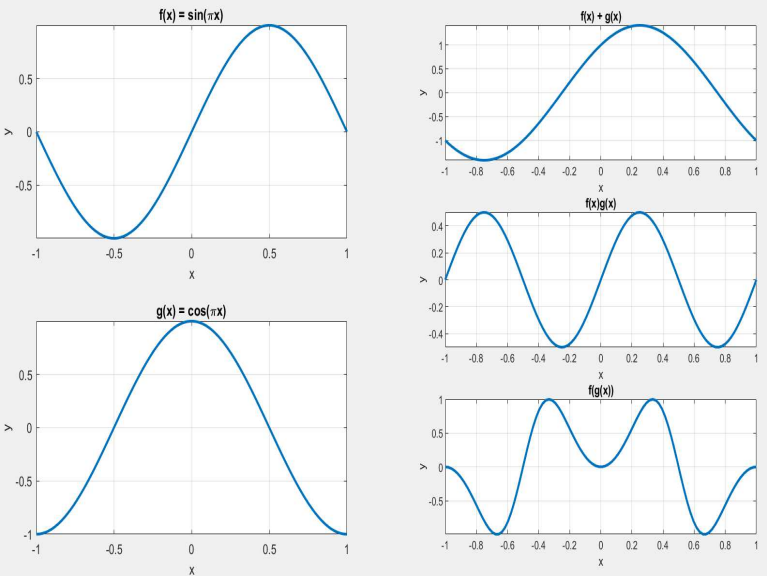
on the same figure for $0 \le t \le \frac{3}{2}\pi$. Use MATLAB options to make the output look identical to the following (note: Look up how to use *xticks* and *xticklabels*. The text *\pi* will print out the symbol π within the tick labels).



2. Revisit your *addMultComp* function from last lab. Use $f(x) = e^{-x}$ and $g(x) = 4x\cos\pi x\sin\pi x$ and your un-altered function to create a single figure with each of the following plotted in the indicated location (choose $-1 \le x \le 1$ with at least 100 points). Label all axis and title each appropriately (eg, *title('f(x)+g(x)')*)

<table>
<tr><td rowspan="2">$f(x)$</td><td>$f(x)+g(x)$</td></tr>
<tr><td rowspan="2">$f(x)g(x)$</td></tr>
<tr><td>$g(x)$</td><td>$f(g(x))$</td></tr>
</table>

Hint: Subplot can be use in multiple ways. Look into the documentation a bit.



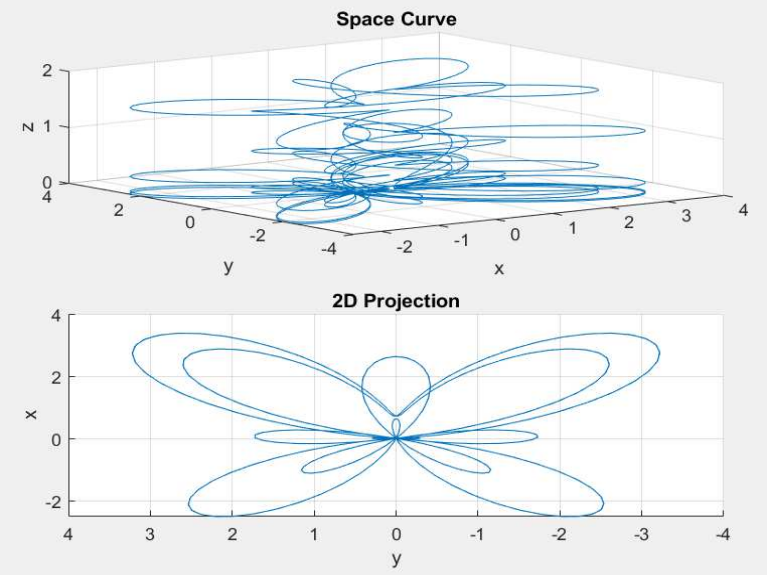
3. Create two plots using subplot with a 2x1 plot structure. In the first, plot the space curve given by

$$x(t) = 3\cos t + 7\cos\frac{t}{4}$$
$$y(t) = 3\sin t - 7\sin\frac{t}{4}$$
$$z(t) = t + 2t\sin t$$

Use 1000 uniform points for $0 \le t \le 50$. In the second part of the subplot, plot the same exact values, but, after the plot command, use the code:

```
view([-90 90])
```

This code plots the same thing, but just changes the view to a "top down" view.



4. Plot a parametric *surface* given by:

$$x(u,v) = \sin^2 u \cos v^2$$
$$y(u,v) = \sin u \sin 3u \sin v^2$$
$$z(u,v) = \sin u \cos 2u$$

Use $0 \leq u \leq \pi$ with 720 uniform points and $0 \leq v \leq 2\pi$ with 730 uniform points (and form a grid containing all combinations of (u,v) points). Label and title appropriately.