

Armstrong Atlantic State University
Engineering Studies
MATLAB Marina – 2D Plotting Exercises

1. Write a MATLAB program that will plot $x_1(t) = 8\cos(50\pi t)$ and $x_2(t) = 5\cos(150\pi t + \frac{\pi}{2})$ on the same axes. The plot should show at least one period of each sinusoid and should have an appropriate title and axis labels. For a sinusoid to look smooth (since MATLAB linearly interpolates between points when joining points with lines) one needs 10 to 25 points per period of the highest frequency sinusoid.
2. Write a MATLAB program that will plot $x(t) = 8\cos(50\pi t) + 5\cos(150\pi t + \frac{\pi}{2})$ for $0 \leq t \leq 0.1$ seconds and $x(t)$ for $0.05 \leq t \leq 0.075$ seconds on separate axis (subplots) in the same figure window tiled vertically. The plots should have appropriate titles and axis labels. Rather than generate two different signals for $x(t)$ for the two time ranges, generate $x(t)$ for the longer time range and then use slicing (indexing) to extract the portions of t and $x(t)$ needed for the second plot. MATLAB logic operations and the `find` function can be used to automate the slicing.
3. Write a MATLAB program that will plot $g(t) = 4t^3 - 2.5t^2 + 3.3t + 2.1$ along with its first $\dot{g}(t)$ and second $\ddot{g}(t)$ derivatives on the same axes. You will need to determine the functions for the first and second derivative of the function so they can be evaluated. The plot of $g(t)$ should be a solid blue line, the plot of $\dot{g}(t)$ should be a dashed green line, and the plot of $\ddot{g}(t)$ should be a dotted red line. The plot should have appropriate axis labels and title and include a legend. Think about what a good time range to plot this over is and how many points are needed for the plots to look smooth. Would this data be better represented by three separate plots (or three subplots) one for $g(t)$, one for $\dot{g}(t)$, and one for $\ddot{g}(t)$ than plotting all three functions on the same axes?
4. Add code to your solution for problem 3 so that the values of t , $g(t)$, $\dot{g}(t)$, and $\ddot{g}(t)$ are saved in a Microsoft Excel file. The values should be saved on sheet 1 with the data for each variable in separate columns. The first row of the sheet should have the variable names and units for the data in the columns below.
5. Write a MATLAB program that will plot the curve traced by the functions: $x(\theta) = 2\sin(2\theta)$ and $y(\theta) = -\cos(2\theta)$ for the angle range $0 \leq \theta \leq 4\pi$ radians. Hint: this is a 2D parametric plot.

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