

ENGR 231 – Linear Engineering Systems  
Lab 2: In Class Assignment Spring 2017

**Perform the following tasks (label cells as task numbers). Note the first cell (unnumbered) should be your Name, date and section number. Tasks follow:**

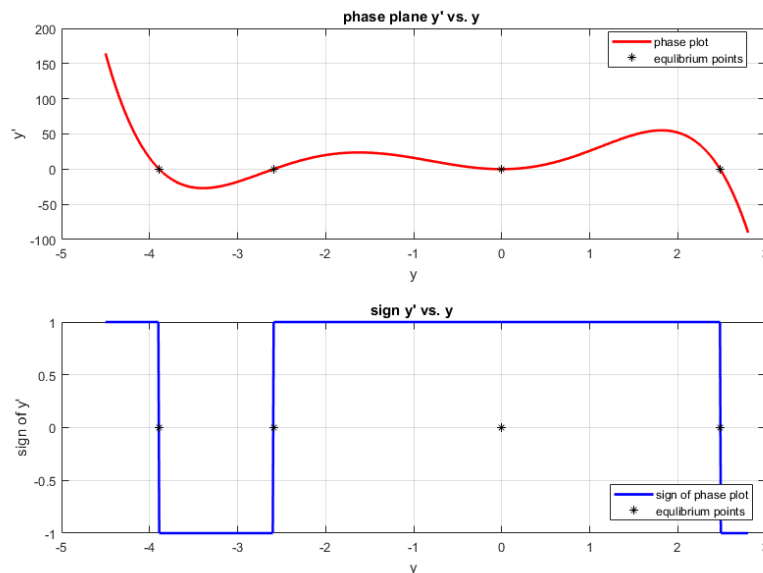
Case	function	Range of y
I	$\frac{dy}{dt} = -y^5 - 4y^4 + 6y^3 + 25y^2$	[-4.5, 2.8]

- Using Matlab, find the equilibrium values of the given function. Hint: help **roots**
- Plot the phase plot,  $dy/dt$  versus  $y$ , for  $y$  in increments of 0.01. Use the range given in the table above. Annotate the plot and all axes appropriately. You should use a linewidth of 2 and a red color plot line.
  - On the same plot show the equilibrium points as black stars.
  - Use legend to designate the phase plot and equilibrium points.

We next need to determine where  $dy/dt$  is positive and negative. Notice the actual plot may be hard to judge. One could use the + magnifier tool on the plot tool bar to help however we want to automate the process. Look up the “find” command and consider something like this

Index\_pos = **find**(ydot > 0);

- Generate the second panel of the subplot showing positive values as +1, negative values as -1, and the zero values (blue line). Again plot the equilibrium points as black stars.



- In a separate cell using comments in your script make a table of equilibrium points, their classification (stable, unstable, semi-stable) and their region of convergence as shown in class.

Note: Submit a published pdf file of your script with convention **lastname\_initials\_section#\_lab#.m** The published document must include all functions used. All figures must be annotated (labels, legends, markers, title, etc. Answers to questions asked should be printed as an output.