

Linear Second-order Equations ¹

1. Enter the following commands:

(a) `y = dsolve('D2y+y=0', 'y(0)=1', 'Dy(0)=1')`

(b) `ezplot(y, [0, 100])`

(c) Explain exactly what happened.

2. Repeat the above procedure to solve and plot the solutions for the following differential equations. Use the same initial condition as above.

(a) $y''(t) + y(t) = \sin(t)$

(b) $y''(t) + 0.1y' + y(t) = 0$

(c) $y''(t) + 0.1y' + y(t) = \sin(t)$

3. Compare the differential equations in the four examples. Then compare the graphs of the solutions in the examples. Based on things you have learned in class, explain the differences between the examples.

4. Prepare a brief (< 1 page) written report answering all the questions and sketching the graphs carefully by hand. Use complete sentences and standard mathematical notation. Do **not** get a printout.

Students explore the interaction of damping, restoring, and forcing effects on the solution.

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