Linear First-order Equations [1]

1. Enter the following commands:

   (a) `y = dsolve('Dy=-0.1*y', 'y(0)=1')`

   (b) `ezplot(y, [-20, 20])`

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

   (b) $y'(t) = -0.1y + \sin(t)$

   (c) Explain exactly what happened in each example.

3. Compare the differential equations in the three examples. Then compare the graphs of the solutions in the three examples. What do you observe from these comparisons?

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 observe that for linear differential equations qualitative features of solutions tend to "add" as terms are added to the righthand side.