Math 3425 Ordinary Differential Equations, Fall 2015

Assignment #1

For Wednesday, August 26:

1. Find some examples of differential equations you care about.

   Choose at least one equation that you do not know how to solve.

   - What do you know about this equation?
   - What situation does the equation model?
   - What do the terms represent?
   - Can you determine the *order* of the equation? Is it a *system*? Is the equation *autonomous*? Is the equation an *ordinary* differential equation, or a *partial* differential equation?

Be prepared to share your example with the class on Wednesday.

2. Find some information on **Euler's Method** and read up on it. This is the simplest numerical scheme for finding approximate solutions to a differential equation. To ground your reading, it will help to try to do something simple with it. Here are two simple tasks to work on.

   A. Do you see the geometry behind Euler's method? Can you draw a schematic representing what the method does?

   B. Try to use Euler's method **by hand** to find a simple approximation to a solution to this *initial value problem*:

   $$y' - y + 1 = 0, \qquad y(0) = 1.$$

   Use only three or four steps, and try to find an approximate solution which exists on the interval $[0, 1]$.