Vocabulary

Be sure you know the definitions of all of these terms.

- Differential equation
- independent variable
- dependent variables
- parameter
- first order DE
- ODE
- PDE
- equilibrium solution
- initial condition
- initial value problem
- particular/specific solution
- general solution

Methods for Understanding Differential Equations

- Analytical Methods - finding or guessing an exact function that solves a differential equation based on the type, or classification, of the differential equation
- Numerical Methods - Using a repeated calculation to approximate a solution to an initial value problem
- Qualitative Analysis - predicting the long term behavior of solutions to a differential equation on a case by case basis where the cases are defined by sets of parameter values and by sets of initial conditions.

Modeling

How translate a description of a physical, biological, etc situation into a mathematical equation

- A delicate blend of art and science
- What assumptions are we making in describing the situation? Do they simplify the problem in a reasonable way? “Everything should be as simple as possible, but not simpler.”
- Based on assumptions, define variables and parameters.
- Based on assumptions, establish a functional relationship among the variables and parameters.
- How do we evaluate if the model is a ‘good’ or accurate model?