Homework 3

CSC-432

Due: 2/11/13

Make sure that you are writing comments in your code.

Question 1 (1 point)

Consider `Figure 3.5.1` in the textbook. Which symbols correspond to stock variables? Ordinary variables? Derived (stock) variables? Flows?

Question 2 (2 points)

Using the model we developed in class for constrained growth, solve the model and graph the logistic equation where the initial population is 1500, carrying capacity is 1000, and the instantaneous rate of births is 50%.

Question 3 (2 points)

Replicate `Figure 3.5.2` from Shiflet and Shiflet by solving the "One-Compartment Model of Single-Dose" for aspirin. Following the steps we laid out in class for writing a simulation program, use `scipy.integrate.odeint` to find the model solution and `matplotlib` to plot the figure. *Note*: You will not need to write a loop because we are using `odeint` to solve the model. You can use a `dt` of `.01`.

Question 4 (3 points)

Replicate `Figure 4.1.7` from Shiflet and Shiflet by solving the "Skydiving Model." Follow the steps we laid in class and use `matplotlib` to plot the figure. *Note*: You can use `scipy.integrate.odeint` to solve the model or write a loop, whichever you find to be easier. You can use a `dt` of `.01`.

Question 5 (2 points)

Rework Question #4. However, this time, code it so that the parachute opening depends on time, not height above the ground. Open the parachute after 17 seconds. Plot the results again. How high is the parachute when it opens?