Homework 6 Part A: Due 10 March 2020

Thinking about the World: An Introduction to System Thinking

Consider each of these observations about some part of the world. What constraints do the *words* impose? What assumptions could you make consistent with the statements? How would you use one or more **difference equations** to *model* what is described? How would you transform each set of one or more difference equations into an *iterative Euler model?*

1. The number of rabbits is changing over time because some of the rabbits have baby rabbits (bunnies).

2. The number of rabbits is changing over time because some rabbits have bunnies, only some of which survive to become fertile rabbits.

3. In an enclosed field, the number of rabbits is changing over time because the field can only support a finite number of rabbits, some of which have bunnies who become rabbits (carrying capacity model)

4. The amount of money in a tax-free bank account changes over time because it earns interest.

5. The number of rabbits is changing over time because some rabbits have bunnies while some rabbits die.

6. The number of rabbits is changing over time because rabbits, some of which have bunnies, compete for limited resources, with some of the losers vanishing from the field never to compete or have bunnies again (competition model)

7. The number of healthy, sick, and recovered individuals is each changing over time because some healthy individuals who come in contact with infected people get sick and then some infected people recover and never get sick again.

8. In a closed economic community, the number of students, workers, and retired each change over time because some students who are mentored by employed become workers; and some workers retire never to work or study again.

9. The amount of money you save changes over time because the government taxes your interest-earning savings at some fixed percentage.

10. Be prepared to discuss the definitions and differences of ***outbreak, epidemic, and pandemic.***