Assignment 5: Due 19 October 2021

Thinking about the World: An Introduction to System Thinking

Consider each of these observations about some part of the world of rabbits. What constraints do the words impose? What assumptions could you make consistent with the statements? How could you build a *system model* that would allow you to explore the effects of different assumptions about the details or structure of your models?

1. Some immortal rabbits have immortal bunnies.

2. Some immortal rabbits have bunnies, some of which survive to become immortal rabbits.

3. An enclosed field can only support a finite number of immortal rabbits, some of which have bunnies.

4. Some rabbits have bunnies while some rabbits die.

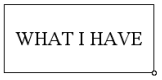
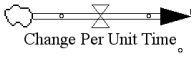
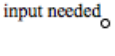
5. Immortal rabbits, some of which have bunnies, compete for limited resources in an enclosed field, with the losers vanishing from the field never to compete or have bunnies again.

6. Some rabbits have bunnies while wolves eat some of the rabbits. Some well-fed wolves have pups, while some wolves die of starvation.

For any 3 of the above examples (your choice):

a) Try to express the model as one or more (coupled) difference equations.

b) Try to express the model as a system diagram using the 4 elements discussed in class:

what you have	a quantity represented with a **box** or container shape, sometimes called a stock or reservoir.	
how something changes per unit of time	a **rate** of change represented with a pipe flowing into or out of a box, sometimes called a flow or pipe. Notice the valve image in the middle, which indicates that the actual number flowing through this pipe can be set.	
what you know	a **variable** or constant input to the model represented with a circle or text.	
what depends on what	A dependency **arrow** or connector from one component to another that can be read as, "I need to know _____ in order to calculate what I am pointing to."