

Math 140 Math Modeling: Predator-Prey Model

1. Work through Tutorials #1: Models and #2: Commands. These will guide you through the basic features of using pre-existing models and familiarize you with the NetLogo program so that we can start developing and analyzing our own models.
2. **Write (either in Word or by hand) a short report addressing these questions and turn it in at the beginning of class on Tues 9/11 (may be done in pairs):**
 - a. In the Sheep-Wolf Predation model, what is the sensitivity of the simulation results to each parameter? For example, does the initial number of sheep affect the long-term pattern in the population? What about changing the wolf-reproduce parameter?
 - b. Pick a parameter that strongly affects the simulation results in the Sheep-Wolf model. Try a series of different values to find as many possible outcomes as you can (e.g., wolves die out, populations go to steady values, populations oscillate). Can you detect any threshold values (tend to get one type of pattern if parameter is below the threshold and another pattern if it's larger)? Be specific: state values or sketch graphs for the different population levels in each pattern and what the parameter values were that gave that pattern.
 - c. In the Traffic Basic model with acceleration set to 0.0045 and deceleration 0.026, find the number of cars that first gives start and stop traffic jam dynamics (with traffic moving steadily at a constant speed if there are fewer cars than this threshold number). How does this threshold number change as you increase or decrease the acceleration?

Homework: Read Chapter 2 and work through section 2.3 of Railsback and Grimm in NetLogo by class on Tuesday. Do Exercise 4 of Section 2.5 to ensure you're getting the hang of NetLogo (there's nothing to hand in for this—it's preparatory work for Tuesday's lab). Note that the book calls the "Code" tab the "Procedures" tab (from an earlier version of NetLogo). Also finish any parts of Tutorials #1 and #2 you didn't have time for in lab.

You can either install NetLogo on your own computer or use NetLogo on a college computer (which should all have NetLogo already installed). Please let me know if you have any trouble accessing NetLogo outside of class.