

BIOL/MATH 2350. Mathematical Modeling in Ecology
Homework #1 (Due 09/10/2009)

Please do the following three things for each of the four questions/situations:

1. Present reasons for using discrete or continuous time for a model.
2. Suggest and justify a possible time span for a model to cover, and a basic time unit to use.
3. Identify one or more variables that would be important to include in a model and explain why.

Questions / Situations

1. How do the concentrations of *E. coli* bacterial cells and nutrient change over time in a flask culture of bacteria that is inoculated with a small population at an initial time?
2. How do the concentrations of *E. coli* bacterial cells change over time in the intestine of a human being?
3. How do the populations of sharks and small fish change over time in the Gulf of Mexico, assuming that the sharks eat the small fish?
4. How do the numbers of grasshoppers eating plants in a prairie change over time, assuming that grasshoppers lay eggs in the fall that hatch in the spring, and that grasshoppers live from spring to fall.