Math 2280 - Maple Project 3

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Spring 2009

In this project we'll explore application 6.3 from the textbook, "Your Own Wildlife Conservation Preserve." In this project we'll assume you own a large wildlife conservation preserve that is originally stocked with F_0 foxes and R_0 rabbits on Jaunary 1, 2007. The following differential equations model the numbers R(t) of rabbits and F(t) foxes t months later:

$$\frac{dR}{dt} = (0.01)pR - (0.0001)aRF,$$
$$\frac{dF}{dt} = -(0.01)qF + (0.0001)bRF,$$

where *p* and *q* are the two largest digits (with p < q) and *a* and *b* are the smallest nonzero digits (with a < b) in your student ID number.

The numbers of foxes and rabbits will oscillate periodically, out of phase with each other. Choose $R_0 = 100$ and $F_0 = 400$. This should give you a fairly eccentric closed curve. Your task is to determine:

- 1. The period of oscillation of the rabbit and fox populations;
- 2. The maximum and minimum numbers of rabbits, and the calendar dates on which they first appear;
- 3. The maximum and minimum numbers of foxes, and the calendar dates on which they first occur.

You should plot the RF-trajectory and tR- and tF-solution curves and use these plots to esimate the above numbers.

Your project should include a writeup explaining what you're doing, and the corresponding graphs and Maple code. To see Maple code that covers the type of functions you'll need for this project, and how you can implement them, download the Maple worksheet that's posted on the class website for this project.