

MAT 333

Population Growth

Lab 3

February 6, 2008

Use dfield7.m, which can be found on the class website, to complete the Exercises in this lab.

Exercises

Due Friday February 8

1. Suppose that the population of a species of fish in a certain lake is growing according to a logistic model with $k = 0.3$ and $M = 3000$. Assume initially there are 2500 fish of that species in the lake.
 - (a) Determine the correct initial value problem.
 - (b) Plot the direction field and a few informative solution curves.
 - (c) Describe the long term behavior of the fish population.
2. Consider the explosion/extinction equation :

$$\frac{dP}{dt} = kP(P - M)$$

- (a) Generate the direction fields when $M = 20$ and $k = 0.8$. Consider different initial populations and describe the long term trends in each case. Please make your answer succinct.
 - (b) Experiment with different M and k . Using a few informative plots, make conclusions about the long term trends of this equation for all values of M and k .
3. Generate the direction fields of the logistic equation with harvesting:

$$\frac{dy}{dt} = y^2 - 2y + h$$

when $h = -4, -2, 0, 2, 4$. Consider different initial populations and describe the long term trends in each case. Please make your answer succinct.