

Math 250a (Fall '07) - Homework 5 extra problems

1. Consider the differential equation

$$\frac{dy}{dt} = ay(b - y) - c$$

where a, b, c are all nonnegative constants. (If $c = 0$ this is the logistic equation.)

(a) The logistic equation is a model for population growth. What might the $-c$ term represent in the model?

(b) Find the equilibrium solutions and describe what they represent for the model.

(c) Think about what will happen when you solve this equation using separation of variables. Note that I did not ask you to actually carry out the solution, just think about what will happen. This is meant to help you do the next part.

(d) Imagine that we keep a and b fixed and vary c . There will be a critical value of c at which the behavior of this differential equation changes qualitatively. Find it. (It will depend on a and b .) Describe how the solutions are different for c above and below this critical value.