Homework assigned Wednesday, September 15

Problem 1. *This is a hold over from Monday.* A population of fish in a large tank grows logistically with a carrying capacity of 500, and an intrinsic growth rate of $r = .2$ (fish/month)/fish.

(a) If internally 300 fish are put into the tank, then what are the initial growth rate of the population and the initial per capita growth rate?

(b) After some point the fish are harvested at rate of 15% of the population per month. What happens to the size of the stable population?

Problem 2. As in the last problem, a population of fish in a tank grows logistically with a carrying capacity of 500, and an intrinsic growth rate of $r = .2$ (fish/month)/fish. If we now harvest the fish at a of 15 fish/month.

(a) Explain why the new rate equation is

$$\frac{dN}{dt} = .2N\left(1 - \frac{N}{500}\right) - 15.$$

(b) Use your calculator to find the equilibrium points of this equation. (There are two of them.)

(c) Sketch a graph of some solutions to the rate equation.

(d) What is the new stable population size.

(e) Is there a threshold so that if the population size drops below this threshold the population dies off.