Exam 1 (Part I)

February 24, 2010

Name: _____

Show all significant work and justify all your answers. This is a closed book exam. Use your own paper and/or the paper provided by the instructor. You have 50 minutes to work on the following 2 problems. Relax.

1. Consider the difference equation $\Delta N = aN$, where a is a nonzero parameter.

   (a) Give an interpretation of the equation as a model for population growth.

   (b) Solve the equation given that N_o is known.

   (c) Find equilibrium point(s) and test for stability. Which values of a yield stability?

2. The following equation models the evolution of a population that is being harvested at a constant rate:

$$\frac{dN}{dt} = 2N\left(1 - \frac{N}{200}\right) - 75$$

   (a) Give an interpretation for the model.

   (b) Find equilibrium points, determine the nature of their stability, and sketch a few possible solution curves.

   (c) According to model, what will happen if at time $t = 0$ the initial population density is 47? What do you conclude?