

Exam 1 (Part II)

February 24, 2010

Name: _____

This is the out-of-class portion of Exam 1. There is no time limit for working on the following two problems. This is a closed-book exam, and you are not allowed to consult your notes or with anyone.

Show all significant work and justify all your answers. Write your name on this page and staple it to your solutions.

Due on Friday, February 26, 2010

3. Consider the linear first order differential equation

$$\frac{du}{dt} = au + b,$$

where a and b are real parameters with $a \neq 0$.

- (a) Find the equilibrium points of the equation.
- (b) Sketch some possible solutions to the equation for the cases $a < 0$ and $a > 0$ in separate graphs. Which one of these yields stability?
- (c) Use separation of variables to obtain solutions to the equation.
- (d) Use your result from the previous part to justify your answers to part (b).