Due December 2, 2010

MTH 2140 Session 02 Quiz 4

Instructions: This is a self-scheduled quiz. You can work for as long as you like, but you can't take breaks. You are not allowed to work in groups or discuss problems with other people and you are not allowed to use notes, books, web browsers etc.
After you have gotten as far as you can in a closed-book environment, you can change pen color and work in an open notes, open book, open internet environment for half credit.
Please place the quiz in my mailbox (in MH250) or in the box outside of my office (MH 257) sometime before Thursday at 5 PM.

Consider the system of differential equations

$$\begin{cases} \dot{x} = x + 3y \\ \dot{y} = -x + dy \end{cases}$$

where d is a real number.

1. Describe how the stability type of the origin varies with the parameter d.
2. For what value(s) of d is there at least one solution for which the x component has exactly one critical point.
3. Find the general solution when $d = -4$.
4. Sketch the phase plane when $d = -4$.