Homework #3

1 Problem 1

Find the equilibrium point(s) of the following friction system

$$\dot{v} + 2av\,|v| + bv = c, \quad a > 0, b > 0, c > 0$$

and analyze the corresponding stability.

2 Problem 2

For the following nonlinear system

$$\dot{x} = -kx + \sin^3(x) + x\cos^2(x)$$

where $k > 2$ denotes a positive constant. Find its equilibrium point and use Lyapunov method to analyze its stability (get a conclusion as strong as possible).

- Show that there is **only** one equilibrium point at

$$x = 0$$

- Utilize the Lyapunov method to analyze its stability around origin.

3 Due Date

11/3/2013