MTH 2140 Quiz 2

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, calculators, etc. Please place the quiz in my mailbox (in MH250) or in the box outside of my office (MH 257) sometime before Wednesday at 5 PM.

- Consider the differential equation

$$\dot{x} = (x^2 - a)(x^2 - 4)$$

  1. Fix $a = 1$. Find all equilibria; for each equilibrium determine its stability type (sink, source, or node).

  2. Regard a as a parameter and find all bifurcation points. For each bifurcation point, describe the qualitative change in the phase line as a passes through the bifurcation point.