Math 3280 Assignment 12.

(1) Compute the equilibria of the following nonlinear differential equations, and use that information to match each equation with a trajectory plot from the following page. It may be helpful to compute the eigenvalues at an equilibrium.
   (a) $x' = x - y$, $y' = x + 3y - 4$.
   (b) $x' = 2x - y$, $y' = x - 3y$.
   (c) $x' = 2\sin(x) + \sin(y)$, $y' = \sin(x) + 2\sin(y)$.
   (d) $x' = x - 2y$, $y' = -x^3 + 4x$.
   (e) $x' = 1 - y^2$, $y' = x + 2y$.
   (f) $x' = x - 2y + 3$, $y' = x - y + 2$.

(2) Find the unique equilibrium of the system $x' = x - y$, $y' = 5x - 3y - 2$. Compute the eigenvalues of its linearization to determine the stability of the equilibrium (see Theorem 2 in section 9.2).