

This is a take home quiz that is due before Friday at 5PM. Please write the solutions to the following *neatly* (5 points) on your own paper and staple them together (5 points). I will not be able to return them before the final exam, so if you want to remember what you did, you might make a copy (scans are free over at the library). I will post the solutions at 5PM on Friday.

1. Modify the Maple files online (`LinearSystems02.mw`) so you can plot the direction field for a nonlinear system of equations (rather than a system of linear equations).

In particular, plot the direction field for:

$$\begin{aligned}x' &= 2xy \\ y' &= -x^2 + 3y^2\end{aligned}$$

On the direction field, also plot sample solution curves for $-1 \leq t \leq 8$ for the following sets of initial conditions:

$$\begin{array}{lll}x(0) = 1 & x(0) = 1/2 & x(0) = -1/2 \\ y(0) = 1 & y(0) = 1/4 & y(0) = -2/5\end{array}$$

Print your Maple file and attach to your solutions.

2. (By hand) Solve the system of differential equations by solving the expression for dy/dx (HINT: It is homogeneous, but solve it as a Bernoulli equation with n a negative number!)
3. Do exercises 1, 4, 7 on p. 494-495, with the following (slightly modified) instructions:
 - (a) Find the eigenvalues and eigenvectors (by hand).
 - (b) Write the general solution to the system (by hand).
 - (c) Classify the origin using the Poincaré Diagram (by hand of course).
 - (d) Sketch the direction field and several solution curves using Maple (one graph for each problem).