

Quiz 6 SHOW ALL WORK

Nov 30, 2018

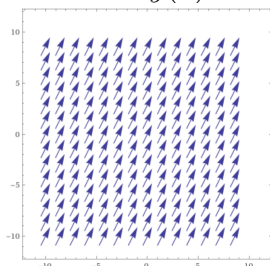
[13] 1.) Find all equilibrium solutions and classify them (stable, asymptotically stable, semi-stable, unstable and if system of DEs, node, saddle, spiral, center). For the non-linear system of DEs, state all possibilities for type of equilibrium solution.

1a.)  $y' = (y - 3)(y - 5)^8$

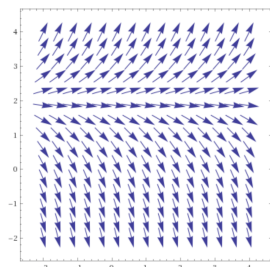
1b.)  $x' = y - 1, \quad y' = (x - 3)y$

[7] 2.) The slope field for a first order differential equation is shown below. In addition to determining and classifying all equilibrium solutions (if any), also draw the trajectories satisfying the initial values  $y(0) = 3$  and  $y(1) = 0$ .

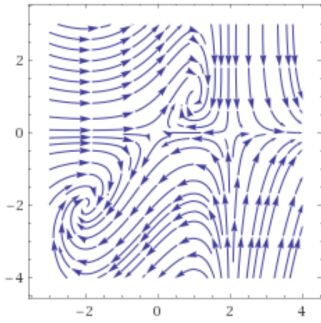
2a.)



2b.)



[8] 3.) The stream plot in the  $x_1$ - $x_2$  plane for a system of two first order differential equations is shown below. In addition to determining and classifying the 4 equilibrium solutions, also draw the trajectory satisfying the initial value  $(x_1(0), x_2(0)) = (0, -2)$ . Also describe the basins of attraction for each asymptotically stable equilibrium solutions.



[5] 4.) Use Picard's iteration method to find a degree 3 polynomial approximation for the solution to the initial value problem,  $y' = y + 6t^2$ ,  $y(0) = 0$ . Start with  $\phi_0(t) = 0$ .

$\phi_1(t) =$

Answer: \_\_\_\_\_

[7] 5.) Using power series to find a degree 3 polynomial approximation for the general solution to  $y' - y = 6x^2$  for  $x$  near 0

Answer: \_\_\_\_\_