

Activity 9: Taylor Methods, Dynamical Systems, and the Laplace Transform

Names: _____ Date: December 7, 2009 Score: _____

Show your work for each of the following. Feel free to ask your instructor for advice if you need it.

1. Find the cubic function that best approximates the solution to

$$y'' - 4y = 0$$

$$y(0) = 5, y'(0) = 6.$$

2. Find the cubic function that best approximates the solution to

$$y'' - 4y = 0$$

$$y(1) = 5, y'(1) = 6.$$

3. Find the cubic function that best approximates the solution to

$$y'' - t^2y = 0$$

$$y(0) = 5, y'(0) = 6.$$

4. (a) Find all equilibria of the differential equation

$$x' = 2 - x^2 - y^2 y' = y^2 - x^2.$$

- (b) Describe as best you can behavior of solutions with initial conditions near those equilibria. Your answer should involve the linearization of the differential equation at the equilibria.

5. Use Laplace Transforms to solve

$$y'' - 4y = 0$$

$$y(0) = 5, y'(0) = 6.$$