

# MATH 271 – Homework #3

due 12 February 2009

**All calculations must be done in Maple!**

1) Plot the direction field for the differential equation

$$\frac{dy}{dt} = y(y - 1)^2. \quad (1)$$

Find a reasonable window to see what the solutions look like.

2) For the differential equation (1), plot a phase portrait with initial conditions  $y(0) = -0.1$ ,  $y(0) = 0.5$ , and  $y(0) = 1.1$ . You may need to use different plots for each of the three solutions.

3) For the differential equation (1), and initial condition  $y(0) = 0.5$ , find a numerical solution and give the approximate values of the solution at  $t = 0.5$ ,  $t = 5$ , and multiples of 10 from  $t = 10$  to  $t = 50$ . What should the values of  $y$  be approaching and are they in fact approaching this value?

4) Solve the system

$$\left\{ \begin{array}{l} \frac{dx}{dt} = y \\ \frac{dy}{dt} = -2x - 3y \\ x(0) = 1 \\ y(0) = 1 \end{array} \right.$$