# Math 222, Fall 2007
## Matlab Project #2: Direction Fields and Nonlinear ODEs
### Due date: November 30, 2007

Adapt the matlab script you developed in Project #1 to use Euler's method with step size $h = 0.01$ to integrate the following IVP:

$$y' = y^2 - t^2, \qquad y(0) = y_0,$$

where your script allows you to specify the initial condition $y_0$. Using your script, do the following:

1. Do a number of runs to $t = 10$, gradually increasing the initial condition from $y_0 = 0$ to $y_0 = 1$. Note that at a certain value of $y_0$, the solution behavior changes significantly. Estimate this critical value of $y_0$ to at least two significant figures.

2. Plot the direction field using the matlab script dfield. To download this script, go to `http://math.rice.edu/~dfield/matlab7/dfield7.m`, then save the file to a local directory using the "Save Page As..." option from the right-click mouse menu. From the matlab command line, make sure the file dfield7.m is in your current working directory, then type dfield7 to run.

3. Use the direction field to explain your result in Part 1.

**Format.** Your project must be typed on a computer, with the exception of equations, which may be written into blank spaces left in the typed text. All graphs must have a title and axis labels (type doc plot at the matlab command line for instructions). Remember to explain your results and to provide sufficient graphical evidence to support them. Include a printout of the script in your project.