

MATH 333

Slope Fields
Lab 2
January 30, 2008

- Download the file `dfield7.m` from the course web site <http://math.boisestate.edu/~mead/m333/s08>. Save the file in the directory where you are running Matlab,.
- At the Matlab prompt `>>` type `dfield7` and use the GUI interface to plot slope fields and solution curves to complete the following Exercises.

Exercises

Due Thursday January 25

1. Consider the differential equation

$$\frac{dy}{dt} = y(y+1)(y-2)$$

- Examine the slope fields in the window $0 \leq t \leq 5$, $-2 \leq y \leq 4$. What is the limit of $y(t)$ as $t \rightarrow \infty$ if $y(0) = 1.9$? If $y(0) = 2.1$?
 - Draw various representative solutions. Do any of the solution curves cross each other? Use the Theorem in Section 1.3 to explain your answer.
 - If $y(0) = \frac{1}{2}$ can y eventually be -1 ? Why?
2. Consider the differential equation

$$y' = \sin t - \frac{y}{2}.$$

- What is the behavior of solutions as t approaches ∞ ?
- Do small variations in initial conditions lead to large changes in the solutions as t increases?
- Are solutions periodic? If so, what is the period?
- Do solutions tend to an asymptote? If so, what is that asymptote?

What to hand in:

For 1. and 2. print one graph for each problem which contains solution curves for each initial condition and any other solution curves which helped you answer the questions. You may type or hand write answers to the questions. Please use complete sentences and good grammar.