MATH 426 - Assignment 11

July 2, 2008

1 Ordinary Differential Equations

In this problem you will use Matlab's built-in ODE solver, `ode45`, to solve a system of ordinary differential equations. The goal is to solve the following system of ODEs.

$$\begin{aligned} y_1' &= y_2 \\ y_2' &= -\frac{1}{5}y_2 - \sin(y_1) \end{aligned}$$

Before doing anything, you will need to define a function containing the right hand side of the above system with the following header.

```
function dydt=yprime(t,y)
```

Remember that `y` is going to be a vector containing the values y_1 and y_2. Your Matlab function will take `t` and `y` and return the derivative `dydt`.

Then, write a script `odesystem.m` which uses `ode45` to solve your ODE system for $t \in [0, 40]$, with initial conditions $y_1(0) = 0$ and $y_2(0) = 3$. Your program should also produce the following plots:

- plot of $y_1(t)$ and $y_2(t)$ vs. t
- plot of $y_1(t)$ vs $y_2(t)$ (the phase plane)