Take-home Exam
BINF 690 – Numerical Methods for Bioinformatics
November 18, 2005
Due November, 21 2005 at 7:00 pm

Do these problems on your own. Do not discuss them with anyone. You may use what ever text, notes, web resources you want.

Problem 1

Consider the following equation which describes the van der Pol oscillator

$$\frac{d^2 y}{dt^2} - \mu(1-y^2)\frac{dy}{dt} + y = 0$$

$$y(0) = 1$$

$$\frac{dy(0)}{dt} = 1$$

Find the solution to this equation using a numerical method of your choice for two cases: i) when $\mu = 1$ solve for $t = 0$ to 20 and ii) when $\mu = 1000$ solve for $t = 0$ to 6000. You can either write your own MATLAB code or use a MATLAB function. Turn in your program and plots of the solutions. If you write your own code, document it so that it is clear what algorithm you used. If you used a MATLAB function explain the algorithm used.

Problem 2

Consider the following velocity data:

Time	1	2	3.25	4.5	6	7	8	8.5	9.3	10
Velocity	5	6	5.5	7	8.5	6	6	7	7	5

Find and report the total distance traveled from t by the numerical method of your choice. You can either write your own MATLAB code or use a MATLAB function. Turn in your program and plots of the solutions. If you write your own code, document it so that it is clear what algorithm you used. If you used a MATLAB function explain the algorithm used.