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Math128B: Numerical Analysis

Programming Assignment #4, Due May 3

In this assignment, we solve the Van der Pol equation

$$y'' - \mu(y^2 - 1)y' + y = 0, \quad \mu > 0.$$

This equation governs the flow of current in a vacuume tube with three interval elements. Let the boundary conditions be $y(0) = 0$ and $y(2) = 1$. We choose $\mu = 1.2$.

Solve this problem with both the shooting method and finite difference method. You should run each method on one initial guess that leads to divergence and one that leads to convergence. For the convergent ones, make sure the iterations have converged to within a tolerance of 10^{-6}. Finally, solve the van der Pol equation using the solver `vdpsol.m` from the class website. Estimate the accuracy of your results by computing the differences between your solutions and that obtained with `vdpsol.m`.

Write a report to summarize your results, and email both your report and your matlab code to Alan by 11:59PM, May 3.