CPS250: HW 3

Due: 3/21/2003

Part 1.

This assignment is to write in Matlab a nonlinear equations solver, using a damped Newton strategy, which is smart in that it identifies when there is trouble and proceeds toward getting a solution. This assignment specification is purposely ambiguous; part of the problem is to specify goals and to produce a reasonable product.

The work should be done in teams as before. However, each person should submit a separate report detailing what was done and identifying the relevant theory and algorithmics behind the team solution strategy. These individual reports should not be written in a group session, although the groups may discuss a common outline.

I suggest an m-function of the form:

function [xroot, fnorm, iter] = dNewton(f, x0, tpick, pintol, stoptol),

as we will discuss in class. The function f should also compute the Jacobian. We will use the steep valley function as the major example, but you should try to extend your work to the block steep valley function. I will send matlab for f and Jacobian(f). tpick should be one of several t-picking strategies. You can use the SVD to help resolve difficulties. I suggest that you use the theory (with respect to k1 and k2) to help decide what to do when trouble arises. You should consider 2-parameter damping and nonlinear elimination.

Part 2.

Do the HW on pages (big font) 234 (eqn 3.107), 253 (eqn 3.155), and 264 (section 3.5.3).

You should ask questions regarding this assignment during the last 15 minutes of lecture time. Your grade will be determined as follows: 50% group grade; 25% write up grade; 25% for advanced features either in group mode or for individuals who want to go beyond the group product. THE WRITEUP IS VERY IMPORTANT!