Numerical Analysis, Computer Project

Root Finding Using Two Dimensional Newton’s Method

1.  Implement the 2D Newton’s method and solve this non-linear system with the 4 initial values: (2, 2), (-2, 2), (2, -2), and (-2, -2).
   1. There are 2 roots for this system, and f(x,y) is a circle and g(x,y) is a parabolic curve. The roots are the intersections of these two implicit functions.
   2. Divide the rectangle (-5,-5) 🡨🡪(5,5) into 4 regions. Mark the regions where all initial points lead Newton’s method to diverge and the regions where all initial values lead Newton’s method to converge.
   3. Stop your program if , or the number of iterations exceeds 20.
2. If an initial point leads the computation converged, please list all the intermediate results. (List  for each time step n.)
3. If possible, draw a figure to show the paths of convergence and divergence.
4. Can you explain the reasons that some initial points lead the computation to converge while others don’t?
5. Print or write all the answers in A4 size papers and hand-in your homework two weeks later in class.