Worksheet #9 (2017/11/1)

Name: ID:

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- We plan to cover Sections 5.6–5.8 (inclusive) today.
- We use Chapter 05 slides 41–55.
- This is corresponding to the textbook pages 237–248.

1) When determine the convergence rate of $g : \mathbb{R} \to \mathbb{R}$, we check $|g'(x^*)|$, where x^* is the solution. How do we check the convergence rate when we face a system of nonlinear equations?

2) In your above description, you use the term *spectral radius*. Please explain it in explain English.

3) Finding all eigenvalues of the Jacobian matrix is going to be very expensive. How can be avoid such complexity?

4) What are the two major weakness of Newton's method when solving a nonlinear equation system?

5) Why does secant update method go by: (i) *secant* and (ii) *update*? Briefly explain the intuition behind its name.

6) Compare Newton's method and secant updating method in terms of: (i) quality improvement per step, (ii) number of steps before convergence, and (iii) overall time complicates; all in typical setups.

7) How to improve the robustness of the Newton's method for nonlinear equation system? We couldn't use bisection method anymore.