Prof. Ming Gu, 861 Evans, tel: 2-3145
Email: mgu@math.berkeley.edu

Math128A: Numerical Analysis
Homework #2, Due Sept. 13, 2023

- **Section 2.2**: Problems **1c, 8, 19, 20**.
- **Section 2.3**: Problems **6c, 8c, 16ad**.
- **Section 2.4**: Problems **2c, 8, 9**. Discussion question 4 (p. 86).
- The speed at which the sequence generated by an iterative method converges is called the methods ORDER of convergence. There are many types of orders of convergence: linear, superlinear, sublinear, quadratic, cubic, and so on. Discuss how a linearly convergent sequence could be accelerated.
- Show that the sequence $\{p_n\}$, for $p_n = 1/n^2$, converges sublinearly to $p = 0$, in that

$$\lim_{n \longrightarrow \infty} \frac{|p_{n+1} - p|}{|p_n - p|^\alpha} \quad = \quad \infty \quad \text{for } \alpha > 1$$

  and that there doest not exist a $0 < \lambda < 1$ such that

$$\lim_{n \longrightarrow \infty} \frac{|p_{n+1} - p|}{|p_n - p|} \quad = \quad \lambda.$$

  How large must n be before $|p_n - p| \leq 5 \times 10^{-2}$?