Numerical Analysis (CS 450)

Worksheet 13

Objectives: (1) Understand behavior of power iteration **(2)** Understand derivation and behavior of QR iteration

Problem 1: Eigenvalue problem: properties and conditioning

(a) A 3×3 matrix has 2 distinct eigenvalues. Is it necessarily defective?

(b) Why is the eigenvalue problem well-conditioned for symmetric matrices?

(c) Suppose $\lambda = 2$ is an eigenvalue of A. Name an eigenvalue of $(A^2 - 2I)^{-1}$.

Problem 2: Power iteration

(a) Power iteration converges to...

(b) Name two problems that can occur when using (normalized) power iteration.

(c) Inverse iteration converges to...

Problem 3: Orthogonal/QR iteration

(a) Name a suitable criterion for convergence of Orthogonal Iteration.

(b) The iterates X_k in Orthogonal iteration converge to...

(c) $Q^T AQ$ in Orthogonal Iteration converges to...

(d) Name a suitable criterion for convergence of QR Iteration.