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Math221: Matrix Computations

Homework #14, Due Dec. 8, 2008

- Let $A \in \mathbf{R}^{n \times n}$ be a square matrix. Let $H \in \mathbf{R}^{n \times n}$ be the upper Hessenberg matrix obtained from Hessenberg reduction on A . It is known that there exists an orthogonal matrix Q such that $Q^T A Q = H$. What is the first column of Q ?
- Let $A \in \mathbf{R}^{n \times n}$ be a square matrix. Let Q be orthogonal and H upper Hessenberg such that $Q^T A Q = H$. Let P be the Householder matrix, the first column of which is the same as that of Q . Define $\hat{A} = P^T A P$, and let \hat{H} be the upper Hessenberg matrix obtained from Hessenberg reduction on \hat{A} . What is the relationship between \hat{H} and H ?
- Problem 6.9.