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Math221: Matrix Computations
Homework #7, Due Oct. 25, 2007

- Let $A \in \mathbf{R}^{n\times n}$ be non-singular. The QR factorization with column pivoting gives

$$A\Pi = QR,$$

  where Π is a permutation. Let D be the diagonal of R and $U = D^{-1}R$, so that U is an upper triangular matrix with unit diagonal entries. This leads to

$$A\Pi = Q\,D\,U.$$

  - Show that $\|U\|_{\max} = 1$.
  - Show that $\|U^{-1}\|_{\max} \leq 2^{n-1}$.
    Hint: Use induction on n.
  - For different values of n and c, compute $\|U^{-1}\|_{\max}$ for the Kahan matrix (kahan.m at class website).

- Problems 4.1, 4.2, 4.3, 4.4, 4.5.