Aero 320: Numerical Methods

Lab Assignment 12

Fall 2013

Problem 1

Vector and matrix norms, and condition number of a matrix

(a) Write a C++ code that computes the 1-norm, 2-norm and ∞-norm of any $n \times 1$ vector.

(b) Write a C++ code that computes the 1-norm, 2-norm, ∞-norm, and Frobenius norm of any $m \times n$ matrix.

(c) For any $n \times n$ *orthogonal* matrix Q, find the condition number of Q with respect to matrix 2-norm and Frobenius norm, i.e. compute $\kappa_2\left(Q\right) = \parallel Q \parallel_2 \parallel Q^{-1} \parallel_2$, and $\kappa_F\left(Q\right) = \parallel Q \parallel_F \parallel Q^{-1} \parallel_F$.