Numerical Linear Algebra
Final Exam Fall 2004

1. Let **A** = **QR** be the factorization of a **A** into the product of a unitary matrix and a triangular matrix. Suppose that the columns of **A** are linearly independent. Show that $|r_{kk}|$ is the distance from the k-th column of **A** to the linear space spanned by the first k - 1 columns of **A**.

2. Let $\mathbf{A} \in \mathbf{C}^{mxm}$ and $b \in \mathbf{C}^{m}$ be arbitrary. Show that any $x \in K_n$ is equal to $p(A)b$ for some polynomial p of degree $\leq$ n - 1.