Stat 6341, Statistical Computing

Syllabus

Text: **Modern Applied Statistics with S,** 4^{th} **Edition**
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Topics	**Chapters**
Numerical linear algebra	class notes
QR decomposition and least squares regression	class notes
Introduction to the S language and statistical programming	VR 1-3
Data explorations	VR 4-5
Statistical models	VR 6-7
SVD and multivariate data	class notes, VR 11

Assignments

Homework 1

1. Verify the inequalities:

   (a) $\|x\|_2 \leq \|x\|_1 \leq \sqrt{n}\|x\|_2$,

   (b) $\|x\|_\infty \leq \|x\|_2 \leq \sqrt{n}\|x\|_\infty$,

   (c) $\|x\|_\infty \leq \|x\|_1 \leq n\|x\|_\infty$,

2. Let $\|\cdot\|$ be a vector norm on $\Re^m$, and let $A \in \Re^{m\times n}$ with $rank(A) = n$. Show that

   $$\|x\|_A = \|Ax\|$$

   is a vector norm on $\Re^n$.

3. Let $x, y \in \Re^n$ and define $\psi(\alpha) = \|x - \alpha y\|_2$. Show that ψ is minimized when

   $$\alpha = \frac{x^T y}{y^T y}.$$