

May 12, 2021

Final

Release: Tues May 18 afternoon

Due: " " 25 "

~ 6 questions (like HW/midterm questions)

~ 1 or 2 will involve coding

Mostly based on post-midterm, but
need pre-midterm tools

Numerical linear algebra

$$Ax = b$$

$$\min_x \|Ax - b\|_2^2 \quad (+ \|x\|_2^2)$$

$$Ax = \lambda x$$

Factorizations

$$PA = LU$$

$$A = LL^T$$

$$A = QR$$

$$A = U \Sigma V^T$$

$$A = V \Lambda V^T$$

$$A = Q \bar{\Lambda} Q^H$$

symmetric matrices

orthogonal matrices

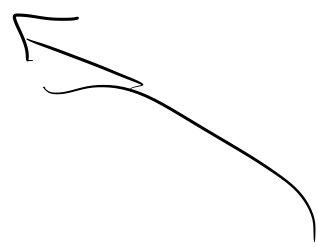
Iterative
methods

QR iter
RQ
Ritz

Inequality:
inactive $h_i(x_k) < 0$
active: $h_i(x_k) = 0$

\Rightarrow

active set \Rightarrow ignore inactive
 \Rightarrow equality-constrained
barrier /
IPMS \Rightarrow unconstrained



Tools

- calculus/analysis: Taylor, mean value theorem
- Computer architectures: blocking, layout, floating point
- graph theory: sparse LU, applications
- stats/data: regularization, HW applications
- approx thry: CG convergence
- probability: SGD, Markov chains