October 19, 2016

Review

In this class:

- *Quick review of Power, block power & SVD*

- *List of topics*

- *Problems from Quiz*

Next class

MIDTERM 2

Next next class

Background I assume

Linear algebra

Calculus

Differential equations

Discrete math

Programming

Probability

I'll try to remind you what you need to know

Topics we've covered

Week 5-6

Intro to matrix methods

Matrix-matrix multiplication
 GEMM

Memory hierarchy

Gaussian elimination

LU factorization

Pivoting

Week 7

Number of ops in LU

Least squares problems

Orthogonal matrices

The Normal Equations

Geometry of least squares

Gram-Schmidt and QR

Week 8

Types of inaccuracies that arise in solving problems

Condition numbers

Algorithm stability

Backwards stable algorithm

Forward error

Condition number of a linear system

Iterative methods

Intro to eigenvalues

Week 9

The power method for eigenvalues.

The block power method for eigenvalues (today)

SVD (today)

Homework questions

Homework 3

Operation counts in simple matrix products

Results of simple matrix computations (e.g. diagonal-times-matrix)

How to implement GEMM

Using matrix-operations to do geometry modifications

Creating a matrix to shrink an image

Homework 4

A production question

The PageRank linear system

Finding a problem with the LU factorization

Using the QR method to solve least-squares

Setting up sports ranking problems

Setting up polynomial fitting

Condition numbers

Iterative methods

Requests for material

LU with pivoting (18)
- How to get L
- Pivoting (3)

Conditioning (2)
- Condition number (3)
- And matrices

Least squares (4)
- Regression
- QR & Least sq (2)
- Ranking

Forward error
- Accuracy definition

Backwards error
- Stability definition

QR factorization (10)

Calculation examples (2)

Norm examples

MatMul cube

Requests for new Material

SVD

Quiz review