

①

Introduction

CS357 - "Numerical Methods"

What does that mean?

Numerical -> Has to do with numbers

Numbers -> Not just one: Multi-dimensional arrays of them

In a sense: A whole course on one simple-seeming data structure

Methods: Algorithms (plus theory that makes them work)

Squiggles demo

Why study that?

The answer is never exactly right. → Error analysis

Computers are fast, but...

Example: linear system

2000×2000 ← not that big

How long for 4000×4000 ?

→ Efficiency
Complexity

Assemble a toolbox

Example:

Change lengths of squiggles

What are we going to do?

Numerical linear algebra

(will provide review aids for linear algebra)

Two big topics:

- Solution (in some sense) of linear systems
- Matrix factorizations

Computation

Python

Array data type and operations (numpy)

Floating point

Nonlinear equations

Optimization

Each with many applications

E.g. search engines, machine learning,
graphics, image processing, ...

[Exercise: inclass-solve-complexity](#)

What's good to know about this class?

Textbook: Klein

Class web page: <https://bit.ly/cs357-s15>

Log in via email

Short (15-20 min) video before each class

Short quiz after that to reinforce learning

Opportunity for questions after quiz

Will discuss in class

Calendar

Grades

Instant messages

Syllabus + Quiz about it

In-class quizzes: Bring computer/phone if possible

Weekly Homework (HW 0 out now, due in a week)

Work generally on Tue

2 Midterms, cumulative, in the evenings

Material download

Virtual Machine

Piazza Questions and (!) Announcements

Python demo

Numpy demo