CS357: Numerical Methods

#1
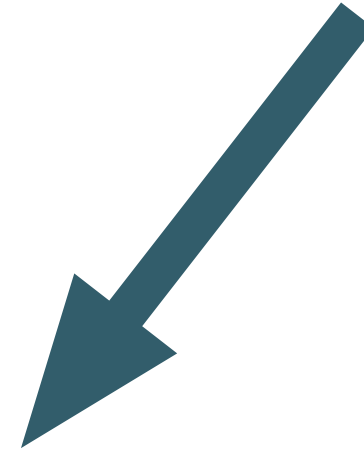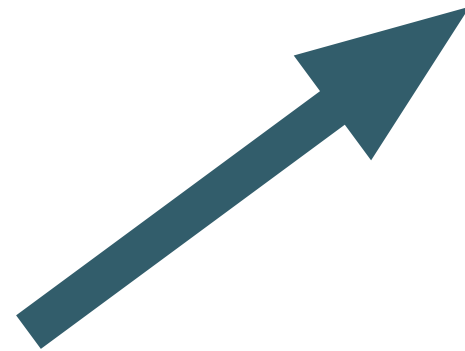
About the Class

- Me: Luke Olson

- TAs:

  - Ryne Beeson

  - Nathan Bowman

  - Erin Carrier

  - Pete Sentz

What is "Numerical Methods"?

algorithms: what/why/how

What is "Numerical Methods"?

numbers…and not just one!

Errors are everywhere

```
In [ ]: x = 0.1
        while x != 1.0:
            print x
            x = x + 0.1
```

Things are expensive

$$A = \begin{bmatrix} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \end{bmatrix} \quad B = \begin{bmatrix} \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \\ \bullet & \bullet & \bullet & \bullet & \bullet & \bullet \end{bmatrix}$$

$$A * B$$

Objectives: Set #1

- Develop a working knowledge of Python and Numpy

- Understand the limitations of computing with finite precision

- Use numerical design and measurement to simulate and study a problem

Build a numerical experiment

Objectives: Set #2

- Restablish linear algebra in a computational setting

- Build a view of a problem in the context of matrices and vectors

- Solve and identify the elements of solving a linear system

- Compute eigenvalues/eigenvectors for different applications

Build a numerical experiment with arrays of data

Objectives: Set #3

- Build an intuition on approximating fundamental operations: interpolating data, integrating data, differentiating data

- See how the tools lead least-squares approximations to problems

- Establish tools to optimize in 1D and in ND

Approximate things using a chunk of data

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About the Class

- The course website:

  - go.cs.illinois.edu/cs357

- Your workflow:

  - Login with your email before class

  - Short collection of pages/videos/slides

  - Often a quiz

About the Class

- Quizzes (starting next week!)

  - Will try to give you ~24 hours

  - Very short. Very direct.

  - Two attempts to submit.

  - 50% credit if submitted after the deadline with 3 days.

  - Deadline: 10min before class.

About the Class

- Homework (starting Friday!)

  - Same system

  - Released on Friday's. Due by the next Friday at 4pm.

  - 1 submit

  - 50% credit if submitted after the deadline with 7 days

Exams

- 3 exams

  - Midterm

  - Midterm

  - Final (comprehensive)

HW	25%
Exam1	20%
Exam2	20%
Final	25%
Quiz	10%

Grading Scale

- No curve

- As: [90,100]

- Bs: [80, 90)

- Cs: [70, 80)

- Ds: [50, 70)

- Fs: <50

Questions?

- Questions about the homework: Piazza

- Questions about grades (quiz scores, exams, homework issues, etc): TA Erin Carrier

- Bugs/Issues with the web: TA Ryne Beeson

Office hours

- 11:30-1pm Monday

- 10:30-12:30 Wednesday

- 4:30-6pm Wednesday (Discussion-like for 1 hour)

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- details on the web

Questions…so…far…