

Numerical Methods

CS 357 - Fall 2016

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Introduction

Numerical Methods: What?

- 'Numerical'? _____
- 'Method'? _____

↳ math idea

↳ formula

↳ algorithm

↳ analysis

↳ accuracy

↳ accuracy - cost
trade off

method = math + cost +
algorithm + accuracy

To do with numbers

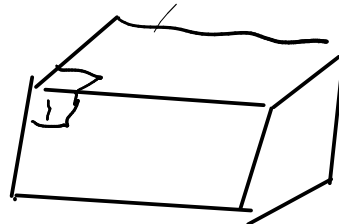
Real numbers

↳ number → computer

Arrays of numbers

10	2	13	1			

1
5
10



Accuracy

- Why might a numerical method **not give the right answer?** (i.e. be inaccurate)
 - Because (unlike in the special cases that math has taught you), mostly we *can't write down the answer*. Not in a finite amount of space anyway. And a computer *is* finite.

Demo: Waiting for 1

Numerical Experiments

Model:

- Small-scale behavior easy to describe
- Large-scale behavior desired, but hard to understand

Demo: Brownian Motion



Numerical Experiments

- What are we going to want to know about a numerical experiment?
 - What's the question?
 - What's the answer?
 - Accuracy
 - Cost of the computation / tradeoff
vs. accuracy
 - Repeatability / Reproducibility
 - Efficiency? → "good use of human/
computer time"

Class web page

bit.ly/cs357-f16

Watch for
Discussion hour
announcements

- Assignments
 - HW0!
 - Pre-lecture quizzes
 - In-lecture interactive content (bring computer or phone if possible)
- Exams
- Class outline q(with links to notes/demos/activities/quizzes)
- Scribbles
- Virtual Machine Image
- Piazza

- Policies
- Video
- Interactive Questions
- Calendar
 - Office Hours

In-class activity: Complexity of Matrix-Matrix Multiplication