Introduction

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Technological developments

- data is super plentiful
- storage, transmission of data is easy
- computers are super fast (and many are super cheap)
- high level programming languages make it easy to do complex stuff
Linear algebra and matrix methods

- branch of math with 200 year history (at the least . . . )
- applied since development of computers (1950s)
  - economics
  - control
  - signal processing
  - simulation
  - statistics and data modeling
- applications have *exploded* since 2000 or so
  - large-scale machine learning
  - image processing
  - medical imaging
  - communication systems
  - embedded intelligent systems
- drift from physics-based towards information-based applications
What EE103 is about

» we will take you from zero to functional in the big world of modern information-based applications (at least, on the math end)

» you’ll learn
  – the math, and how it’s connected to the real world
  – about some cool applications (and some not cool ones, too)

» and, *you’ll actually do stuff with it*
  – data fitting and classification
  – tomography
  – control
  – portfolio optimization

(to mention just a few things)

» we’ll de-mystify some things that (might) look like magic to you now
Prerequisites

you should know:

▶ minimal programming
  (CS106A is co- or prerequisite, but more than you need)
▶ some calculus
  (Math 51 is more than you need)

you don’t need to know:

▶ any linear algebra
▶ any of the applications

the course is still under development, so you’ll need some

▶ patience (with us, the software . . . )
▶ tolerance (of disorganization, inconsistencies)

. . . and please give us feedback on any aspect of the course
Requirements

- attendance at lecture
- attendance at weekly section
- weekly homework
- midterm
- final
Julia

we’ll be using Julia, a relatively new computer language

- open source (like all real languages)
- can be used to write simple scripts (like matlab)
- but also is very efficient
- supports really fancy stuff (that we won’t use)
- but is still under development . . .
Course web site

- all official course info on course web site
- if you find an error or inconsistency on the web site, let us know
- we’ll update it often, so please check back and refresh your browser
The book

textbook is *Vectors, Matrices, and Least Squares*
Stephen Boyd (Stanford) & Lieven Vandenberghe (UCLA)
online at course web site
still in draft form, not totally consistent with slides
we will quietly update it with corrections, updates
so, don’t print it
let us know when you find typos, inconsistencies
yes, you *will* read all of it over the quarter