Lecture 20
Some parting thoughts . . .

- linear algebra
- levels of understanding
- what's next?

Linear algebra

- comes up in *many* practical contexts (EE, ME, CE, AA, OR, Econ, . . .)
- nowadays is readily *done*
  cf. 10 yrs ago (when it was mostly *talked about*)
- Matlab or equiv for fooling around
- real codes ($e.g.$, LAPACK) widely available
- current level of linear algebra technology:
  - 500 – 1000 vbles: easy with general purpose codes
  - much more possible with special structure, special codes ($e.g.$, sparse, convolution, banded, . . .)

Levels of understanding

Simple, intuitive view:

- 17 vbles, 17 eqns: usually has unique solution
- 80 vbles, 60 eqns: 20 extra degrees of freedom

Platonic view:

- singular, rank, range, nullspace, Jordan form, controllability
- everything is precise & unambiguous
- gives insight & deeper understanding
- sometimes misleading in practice

Quantitative view:

- based on ideas like least-squares, SVD
- gives numerical measures for ideas like singularity, rank, etc.
- interpretation depends on (practical) context
- very useful in practice

- must have understanding at one level before moving to next
- **never forget** which level you are operating in

What's next?

- EE364a — convex optimization I (Win 12-13)
- EE364b — convex optimization II

(plus lots of other EE, CS, CME, MS&E, Stat, ME, AA courses on signal processing, control, graphics & vision, machine learning, computational geometry, numerical linear algebra, . . .)