Where to go after 18.06 / 18.C06?

- **IAP 2023**: 18.S096 **Matrix Calculus** (github.com/mitmath/matrixcalc)
- **IAP 2023**: 6.S098 **Intro to Applied Convex Opt.** (convex.csail.mit.edu)
- **Numerical linear algebra (etcetera):** 18.330 (U), 18.335/6.7310 (G)
- **Optimization methods**: 6.7201 (U) / 6.7200/15.093/IDS.200 (G)
- **Machine learning**: 6.3900 (U)
- **Rigorous abstract algebra:** 18.701 (U)
  - Consider 18.090 (U, spring) *first*: gentle introduction to proof-centered math
- **Linear algebra for functions** and PDEs**:**
  - 18.303 (U): **Linear Partial Differential Equations** (analysis+numerics)
  - Rigorous, less applied: 18.102 (U) **Functional analysis** (requires 18.100)
- Computing in **Julia:** 18.S191/18.C25 (U) and 18.337/6.7320 (G)

Think you know all about derivatives from 18.01 and 18.02?

Try:

$$\frac{d}{dA} A^{-1} \quad \textbf{or} \quad \frac{d}{dA} \det A$$

(where A is an $m \times m$ matrix)

What the heck is a derivative with respect to a matrix?

Find out much more and why it matters for machine learning, engineering design, automatic differentiation, and more, in:

18.S096 in IAP 2023: **Matrix Calculus**

3 units, prerequisite 18.06+18.02

github.com/mitmath/matrixcalc

6.S098: Intro to Applied Convex Optimization

- **Learn how to use optimization to solve real-world problems**
  - *Computer science:* graph problems (e.g., max flow), partitioning
  - *Engineering:* design of mechanical structures, circuits, power systems
  - *ML:* robust regression, classification (e.g., SVMs), distribution estimation
  - *Signal processing:* audio denoising, image colorization, compressed sensing
  - *Finance:* robust portfolio optimization, FX arbitrage, options pricing
  - and more…

Check out convex.csail.mit.edu for more