Quiz Date: Friday, 25 January, 2019

Textbook Reading: Sections 6.2 (GE with pivoting), 6.3 (review of matrix/vector arithmetic), 6.4 (determinant review), 6.5 (LU factorization)

Reminder: solutions will not be posted, but the TAs are expecting you to bring your questions to the tutorials. You may also bring questions to the Wednesday afternoon office hours.

---

0) **Basic Ideas**
Be very familiar with the following:

- scaled partial pivoting & its intended advantage,
- flops & operation counts,
- how to derive an inverse matrix using (exact) row operations,
- the matrices corresponding to the basic row operations.

1) **GE with Pivoting**
Textbook problems from Section 6.2:

#9 (a,b) without pivoting & finite-precision arithmetic.

#13 (a,b) with pivoting & finite-precision arithmetic.

#13 optional (c) this is an example of a poorly-scaled matrix (some matrix elements are around 100) — I would simply divide those equations by 100 before using GE.

2) **Operation Counts**

- $[A]$ is an $M \times N$ matrix and $\vec{x}$ is a vector of length N. How many floating point operations are required to compute the vector $\vec{y} = [A]\,\vec{x}$?
- How many floating point operations are required to compute the matrix product $[A]_{M\times P}\,[B]_{P\times N}$?
- How many floating point operations are required to compute the product $\vec{y} = [C]\,\vec{x}$ when $[C]$ is an $N \times N$ upper triangular matrix?

3) **LU Factorization**
Textbook problems from Sections 6.3:

#12 (a,b) use the properties from Theorems 6.12 and 6.14.

#14 (a,b) just a matter of watching where the zeros go.

- find the inverses of the matrices corresponding to the three basic row operations.
