Assignment #6

Due Friday 24 October, at the start of class ⟵ *revised date*

Please read Lectures 10, 11, 12, and 13 in the textbook *Numerical Linear Algebra*, SIAM Press 1997, by Trefethen and Bau.

DO THE FOLLOWING EXERCISES FROM THE TEXTBOOK:

- **Exercise 11.3**
- **Exercise 12.2**

  (Exercise 13.4 was moved to Assignment 7)

DO THE FOLLOWING ADDITIONAL PROBLEMS.

The Matlab built-in `qr()` *computes the QR factorization using Householder reflectors (Lecture 10). Generally you should use it when QR is needed, but of course you can check it against* `mgs()`*, which you wrote on Assignment #5 from Lecture 8.*

P14. By applying Matlab's backslash command, reproduce Figure 11.1. Then, by applying Algorithm 11.2, using the `qr` and backslash commands, reproduce Figure 11.2. Please make at least a modest effort to capture the appearance of these Figures. (*Hints.* Note `axis off` creates a clean picture without ticks and axes labels. You can put back the black axes using `plot([-6 6],[0 0],'k')` and similar.)

P15. Suppose A is a 101×101 matrix with $\|A\|_2 = 50$ and $\|A\|_F = 51$. Give the sharpest possible lower bound on the 2-norm condition number of A. (*Hint. Write everything in terms of singular values, and then think about best cases for* $\kappa_2(A)$.)