ECE 275A – Reading & Homework # 1 – Due Tuesday 10/8/2019

Reading. Carefully read Chapters 1 (ignore Section 1.9) and 2 of Moon & Stirling, and Chapter 1 of Kay. Pay particular attention to all worked examples. In particular note all case where the problem solution depends on the solution of a linear inverse problem $y = Ax$. (E.g, Equations (1.16), (1.37), (1.42), etc., of Moon.)

Also, do a first-pass reading of the lecture supplement on Hilbert space theory, taking pains to relate the material in Moon Chapter 2 to the lecture supplement. (We will be elaborating on the material given this lecture supplement over the next few weeks as we quickly move through material drawn from Chapters 2-8 of Moon.)

Because of the *large amount of requested reading*, you've been given a week-and-a-half from the first lecture of the quarter to complete the first homework assignment.[1]

Comments on the Textbook by Moon and Stirling. Unfortunately the textbook by Moon and Stirling has a very large number of errors and typos. Try to purchase or gain access to at least the third printing of the book,[2] which can be identified by the corrected title on the spine ("... for Signal Processing" has been added).

Homework:

1. Prove the Cauchy-Schwartz Inequality.

2. Moon 2.1-4. Note that here $\|\cdot\|$ denotes the norm induce by the standard inner product on $\mathbb{R}^n$, $\|x\|^2 = x^T x$.

3. Moon 2.12-57 and 2.12-58.

4. Moon 2.12-60.

5. Moon 2.13-73.

6. a) Prove that a hermitian matrix has real eigenvalues. b) Prove that a positive semidefinite hermitian matrix has nonnegative real eigenvaues. c) Prove that the eigenvectors of a hermitian matrix are orthogonal (or can be chosen to be orthogonal) with respect to the standard inner product, $< x, y >= x^H y$.

7. Begin answering the ECE174 midterm questions located on the class website. You will be asked to turn in the answer to these questions when the *second* homework assignment is due.

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[1]So don't delay as you likely will not be able to comfortably do the reading and answer the homework questions at the last moment.

[2]Note: A new *printing* is *not* the same as a new *edition*.