ECE 275A Reading and Homework # 1, Due Tuesday 10/6/09

Reading. Carefully read Chapters 1 (ignore Section 1.9) and 2 of Moon, 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 to complete the first homework assignment.

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, 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 $\mathbb{R}^n$, $\| x \|^2 = x^T x$.


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 eigenvalues. 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.

---

1Note: A new printing is not the same as a new edition.