MAE 306 Notes #1a
Engineering Mathematics II

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1 Reading and Homework Assignments

Study the first half of Chapter 17, pp. 844-887 of Michael Greenberg's *Advanced Engineering Mathematics*, and do the problems assigned below. Note that some problems have answers in the back of the book; they are marked by an underline. The problems are due on Tuesday, February 9, 1999, 5PM.

Please submit your homework to the MAE 306 homework **IN** tray outside D-302, E.Q.

- §17.1, 17.2. Learn how to express any function as the sum of an even and an odd function, and the definition of *fundamental period* of a periodic function.

  Problems on pp.849-850:

  - #**5**(a), (e) and (g);
  - #**11**(a) and (d);
  - #**13**(a) and (g).

- §17.3.1-3. §17.3.4 is optional (we will have plenty of opportunities to work with complex numbers and formulas later). Theorem 17.3.1 is the main message here—after you are told the *Euler formulas* for the coefficients of the Fourier Series. Note that the Theorem is merely stated, and no proof has been offered. §17.3.3 shows you how to use Fourier Series to solve for the particular solution of a linear ordinary differential equation driven by a periodic forcing function; the solution procedure is significantly simplified by the use of *superposition*—taking advantage of the linearity of the problem. Make sure you know what *Gibbs phenomenon* is (p. 854).

Problems on pp.866-869:

  - #**4**(a), (g) and (i);
  - #**6**(a), (c), (f), using any software package that you are comfortable with. Do this problem last—after all the rest of the problems have been done.

- §17.4; simple stuff. §17.5, optional readings. The message: if you are interested not in a periodic function with a given fundamental period over all values of x, but are interested in an arbitrary function in a given finite interval, how can Fourier Series be of service to you? Look at Fig. 1 and Figs.3(a,b,c,d).

  Problem on p.873:

  - #**2**(a) for HRC only.

- §17.6. We will briefly review §9.6 which introduced the concept of *vector space*. The punch line is the innocent short paragraph just before Theorem 17.6.1, where it asserts (without proof) that the least-squared error goes to zero when more and more terms are included in the Fourier Series. This section answers the question: what does one mean when one says this thing (called the Fourier Series representation) is an *approximation* to my function? It does not mean (17) on p. 885! Rather, it means (18) on p. 885.

  Problem on pp.885-887:

  - #**3**. While this question can be answered using mathematics, the basic idea can easily be expressed in English. Explain that "**f** and **g** are . . . indistinquishable" using English alone. (in other words, just talk!).

I have assigned a total of 15 problems (including 3 involving the use of computer software), and my best judgment is that it is a reasonable load (perhaps somewhat on the heavy side). Give me feedbacks.