Assignment #3

Due *Tuesday, 27 September, 2005.*

I. The prerequisite demands of chapter 13, *Integral Transforms*, are much like those in chapter 12; see assignment # 2.

In chapters 14 through 16 we will cover initial value problems for ordinary differential equations. Much of that material should be review.

I again emphasize that chapter 8, linear algebra, is very important. (Perhaps you have not yet been convinced to review it; you will, in time.) I will assign problems from the review sections of chapter 8—see assignment # 2—starting with the next assignment. I will cover the non-review sections of chapter 8 at what I think is the appropriate time: between chapters 16 and 17.

II. Do exercises

2.22, 2.45, 7.4, 7.8, 7.11, 7.26,
12.25, 13.1, 13.2, 13.5, 13.7, 13.9.

III. Do an additional exercise:

Exercise A. Suppose $f(x)$ is *complex*-valued and periodic.

(i) Show that if $f(-x) = f(x)^*$ for all $x \in \mathbb{R}$ then $c_r = c_r^*$ for all integers r. (In particular, it follows that c_r is real and $c_r = \frac{1}{2}a_r$.)

(ii) Show that if $f(-x) = -f(x)^*$ for all $x \in \mathbb{R}$ then $c_r = -c_r^* = -\frac{1}{2}b_r i$.

(iii) What symmetry property for c_r follows if $f(x)$ is assumed to be "even" in the sense that $f(-x) = f(x)$? If $f(-x) = -f(x)$?

[These considerations motivate me to say: The authors of the textbook should have been more careful in emphasizing in the first paragraph of section 12.3 that they were talking about odd and even *real*-valued functions. The definition of "even" and "odd" in the complex-valued case is not quite standard. One frequently wants "$f(-x) = f(x)^*$" and not "$f(-x) = f(x)$", though it depends on the context.]