Table of Contents for Chapter 1 The Fourier Integral Transform and Related Topics

1. The Fourier Integral Transform 1

2. Proof of the Fourier Integral Transform 1

3. The Convolution Theorem 2

4. Applications of the Convolution Theorem 3
   (a) the Green's Function g, transfer function G , and filter theory 3
   (b) a simple RC filter section 4
   (c) a simpler example: d/dt 5

5. Fourier Integral Conventions 6

6. Relation between Fourier and Laplace Transforms 7

7. Real x(t) and the reflection rule for X(ω) 8

8. Very simple examples of spectra 8
   (a) constant 8
   (b) delta function 9
   (c) step function 9

9. Spectrum of an isolated square pulse 9

10. The Area Rules and Parseval's Theorem 10

11. Differentiation and Integration Rules 11

12. Translation Rules 12

13. Exponential Sum Rules 13

13A. Delta Function Technology 14
   (a) integral form of the exponential sum rule 14
   (b) discrete form of the exponential sum rule 16
   (c) Undoing the limit for δ(0) 17
   (d) Example 1 17
   (e) Example 2 18

14. About the sinc function 19

15. The question of negative frequencies and the real world 20

16. The Final Value Theorem 22

17. The Initial Value Theorem 23