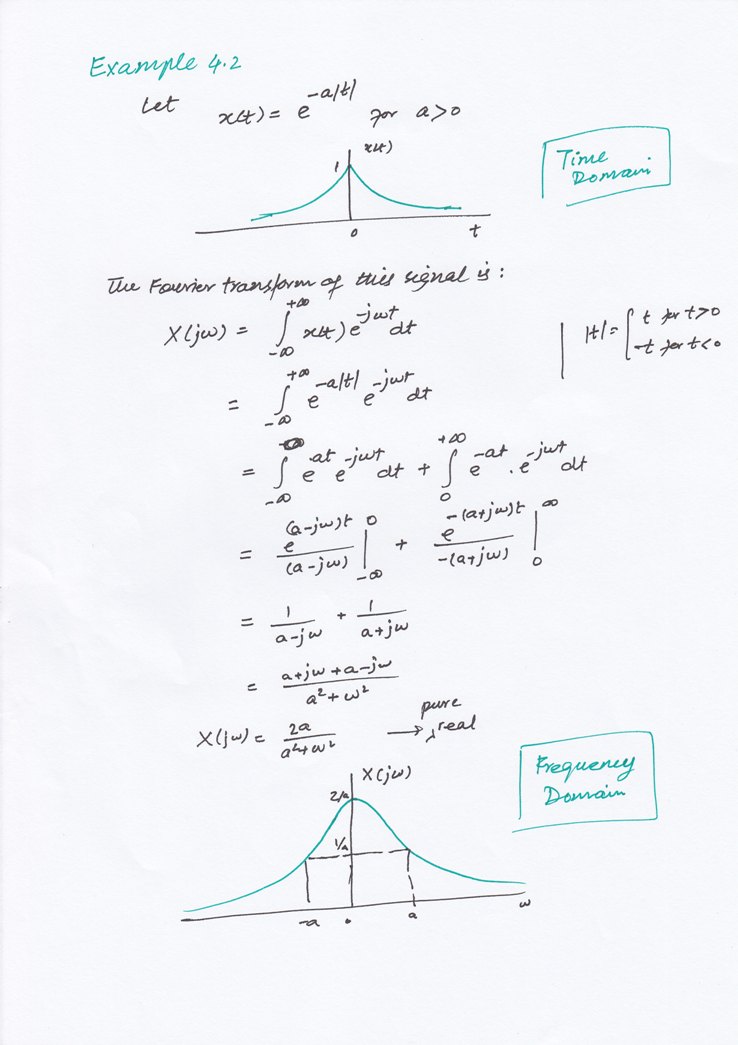
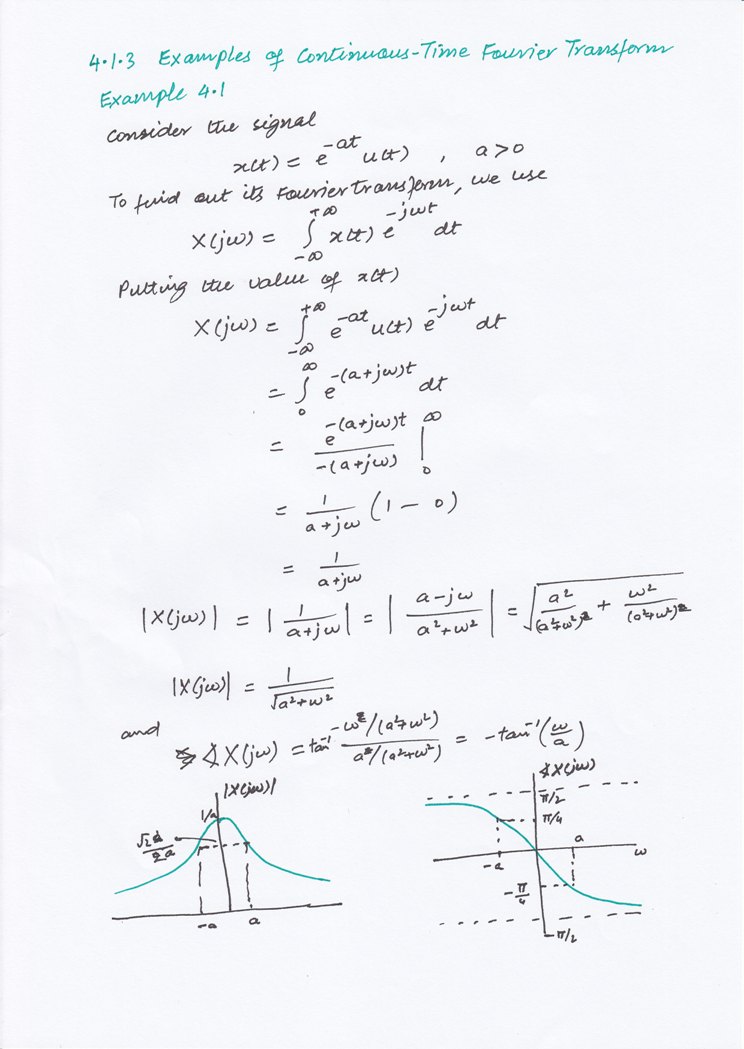
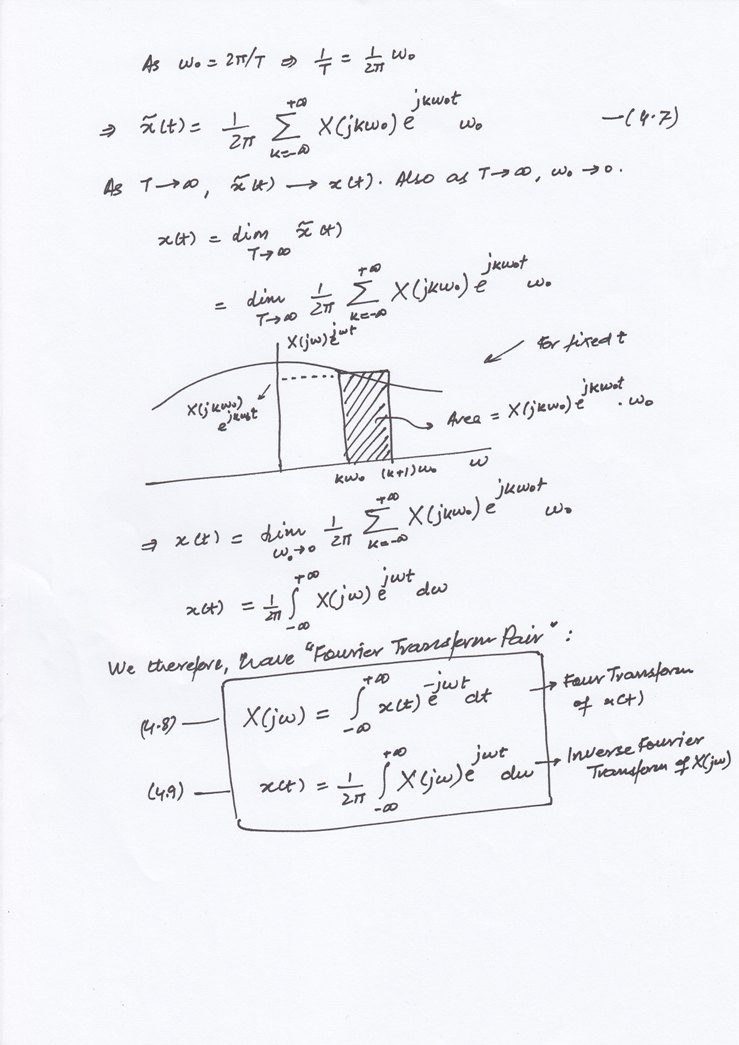
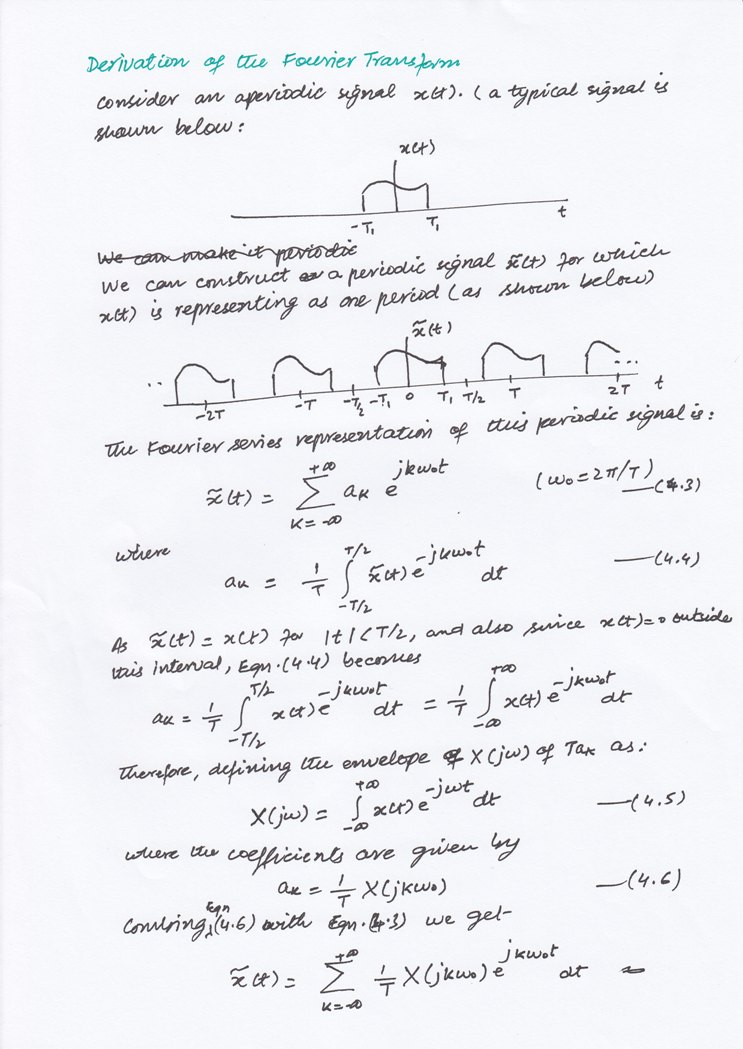
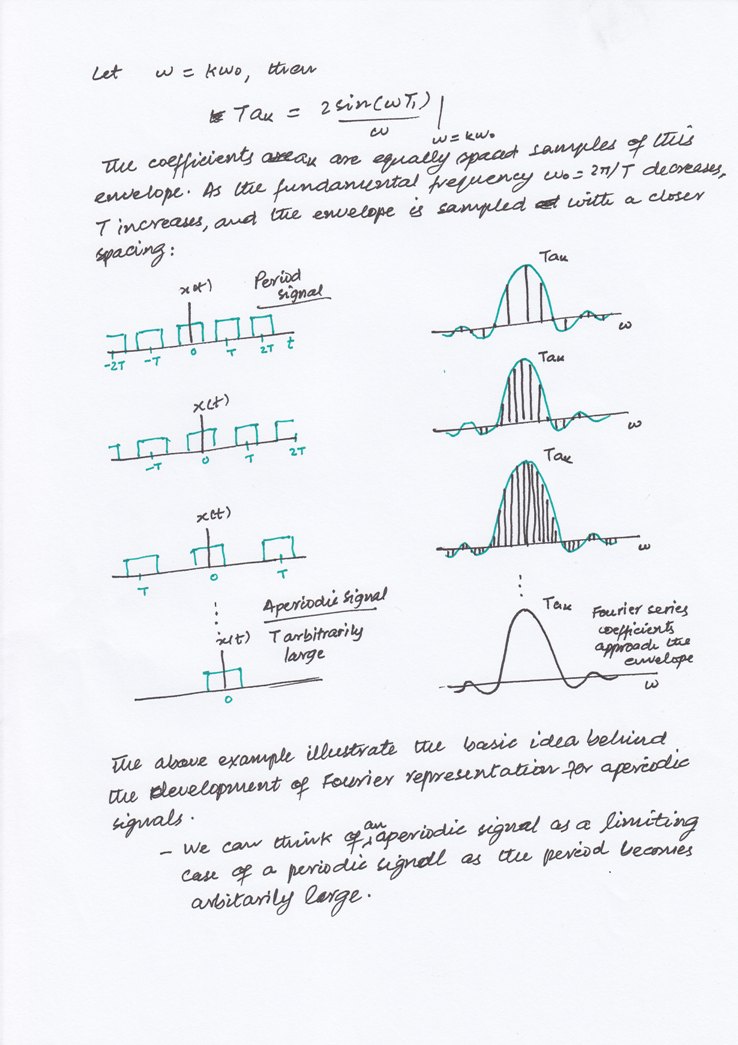
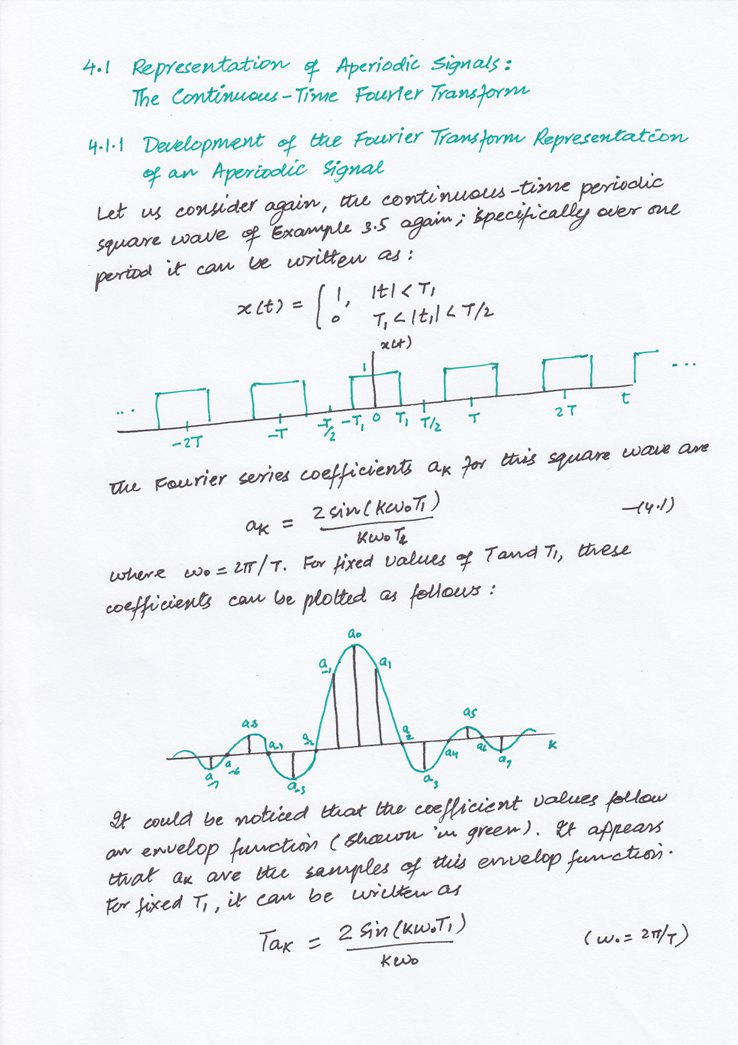
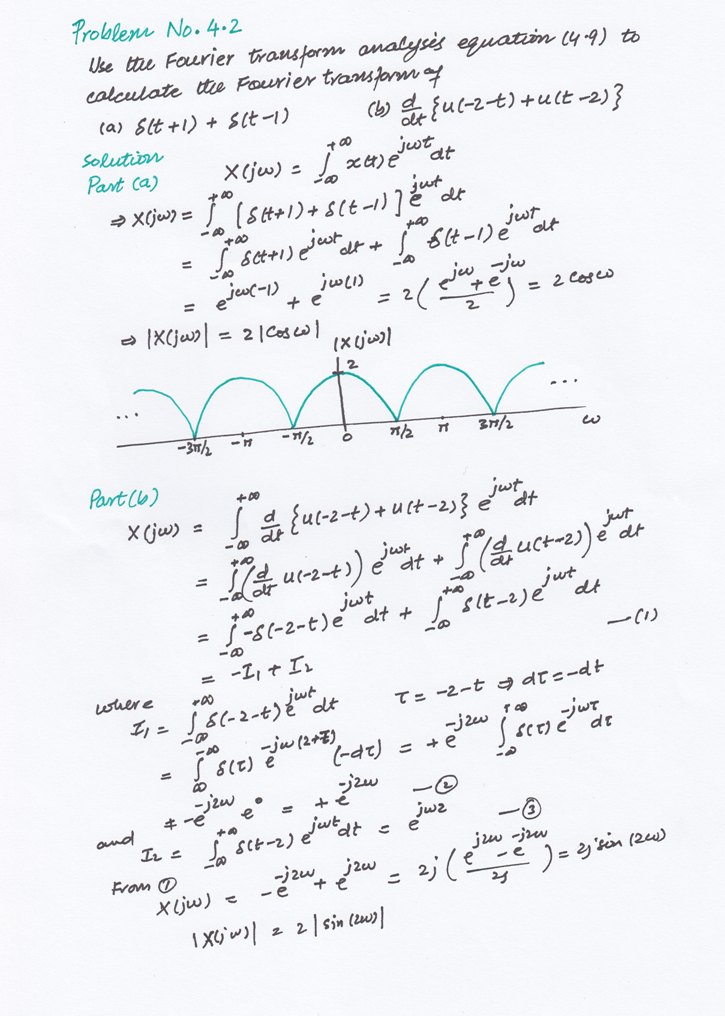
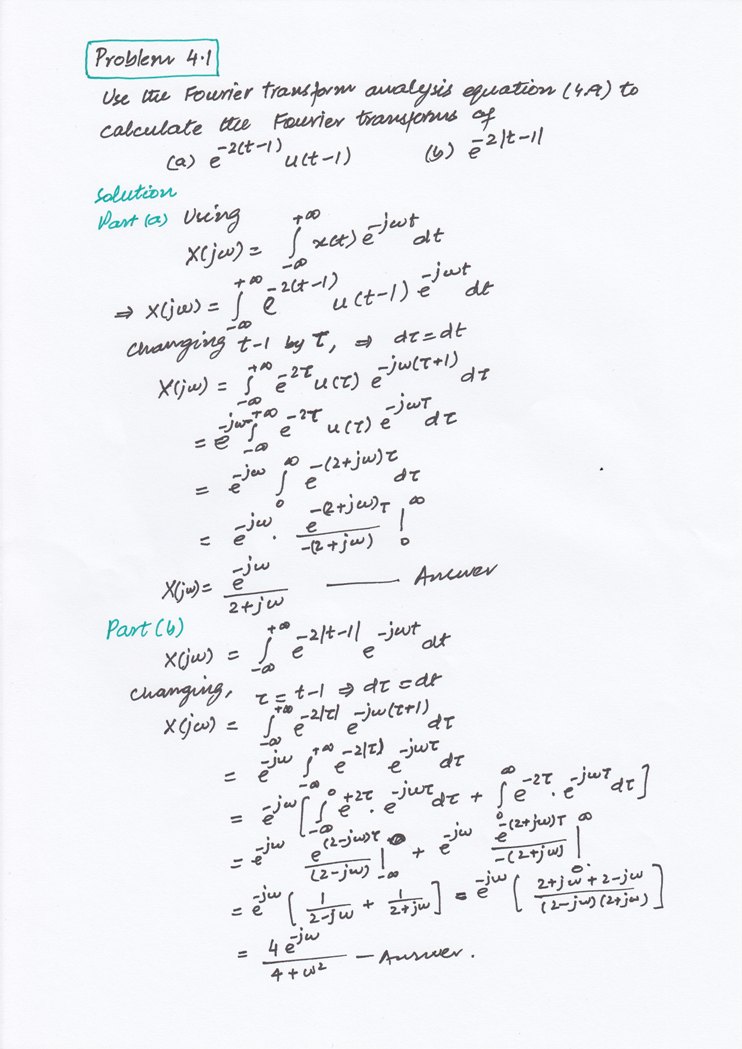
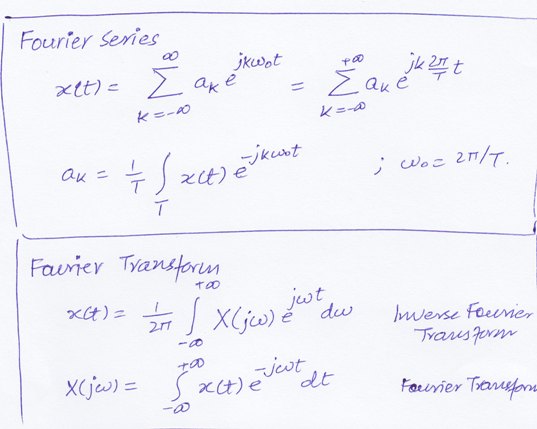
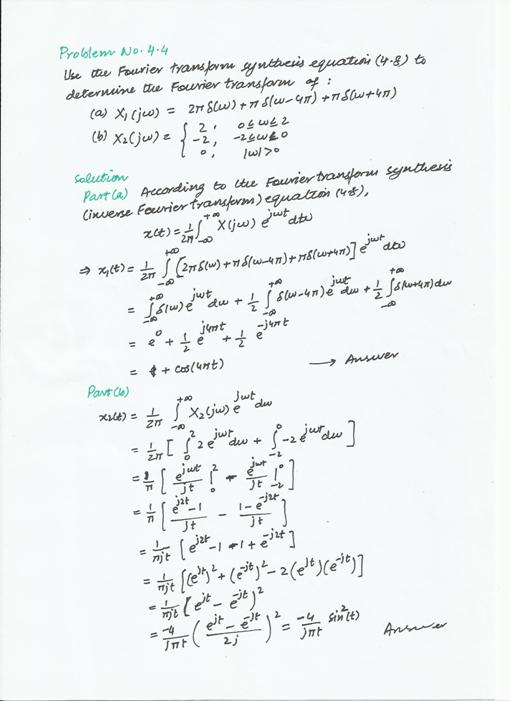
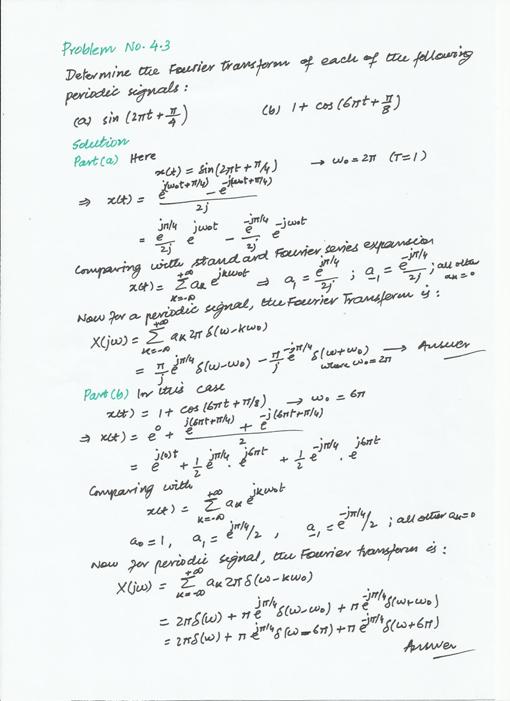
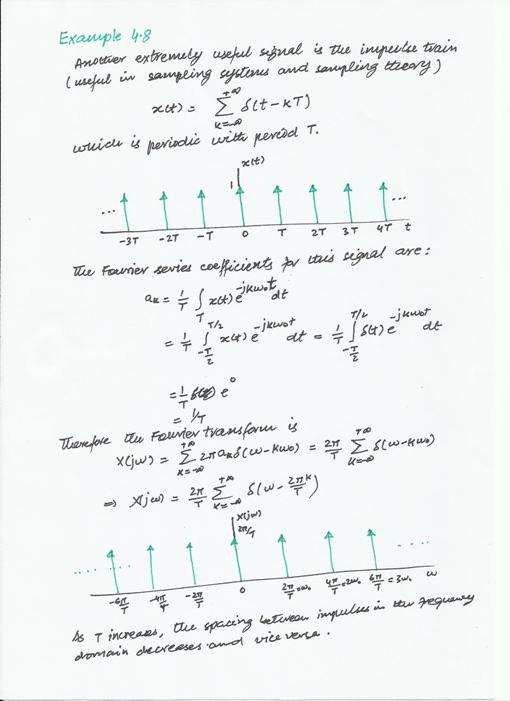
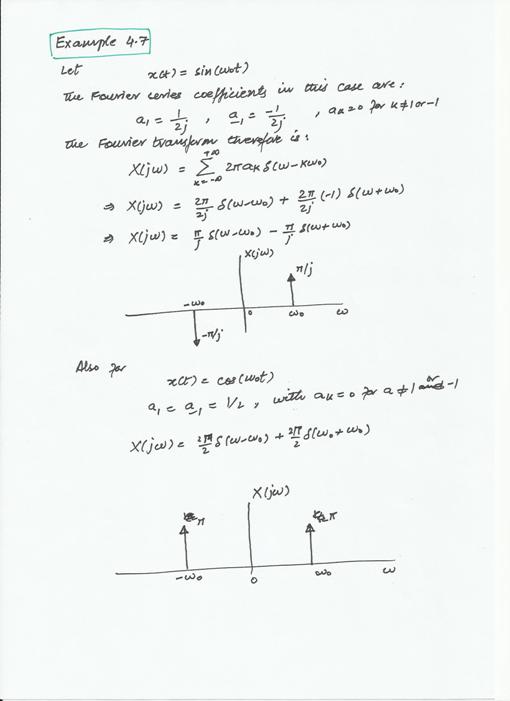
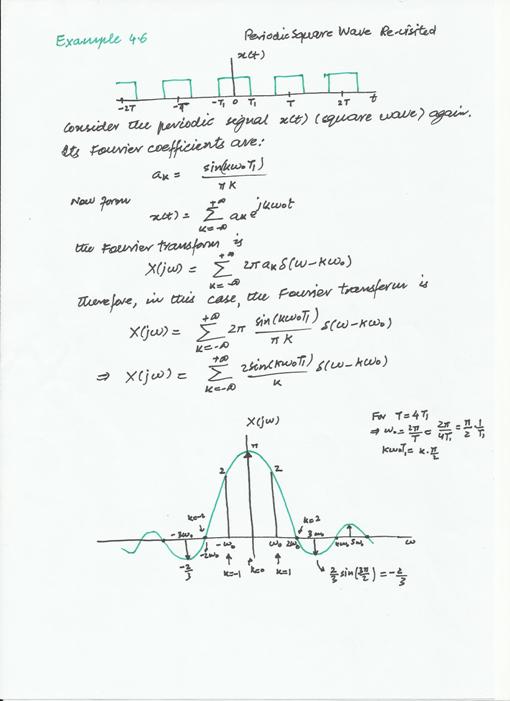
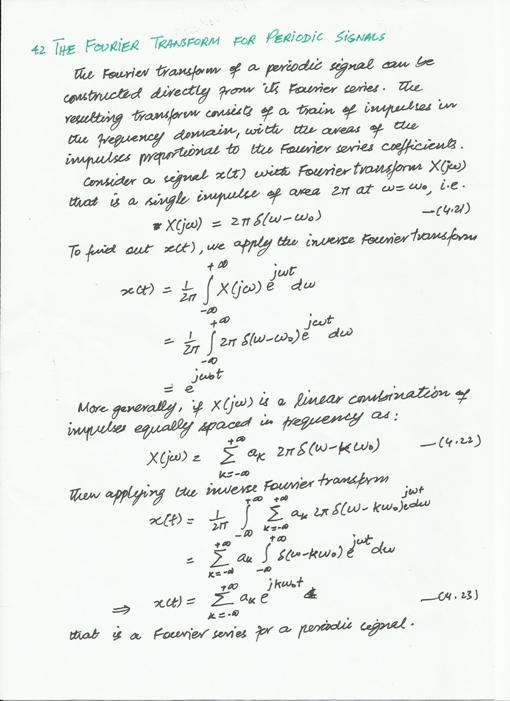
1. **The Continuous-Time Fourier Transform**
   1. **Introduction**
   2. **Representation of Aperiodic Signals: The Continuous-Time**

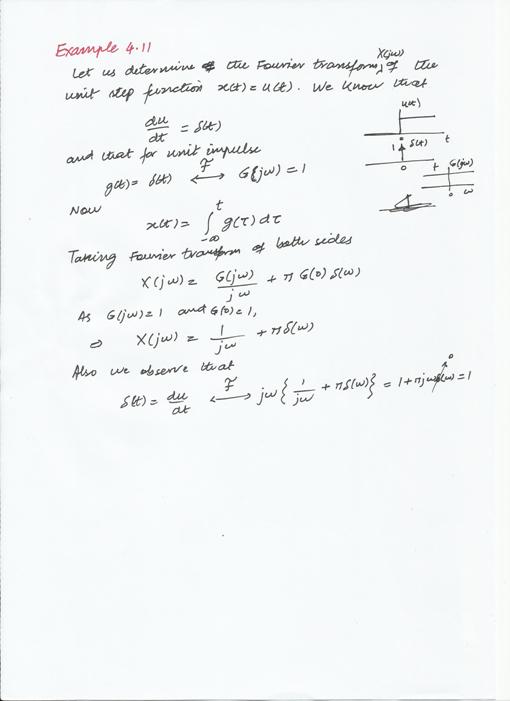
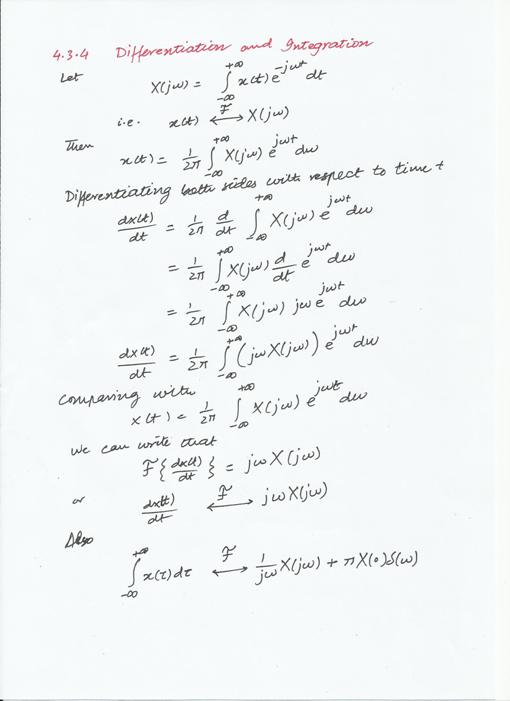
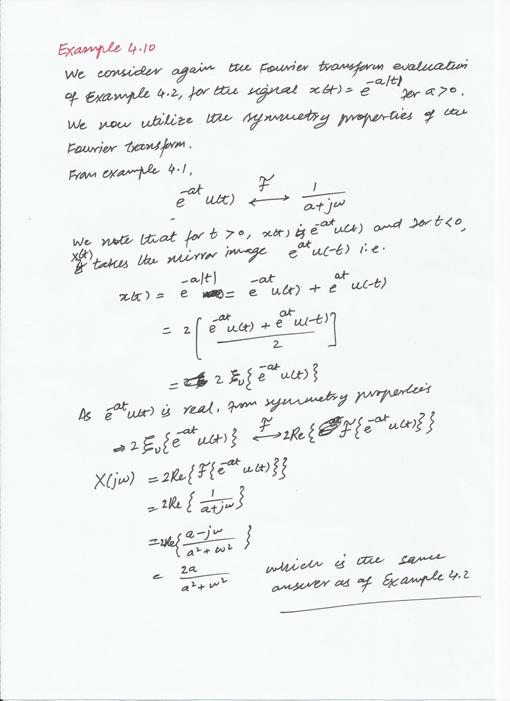
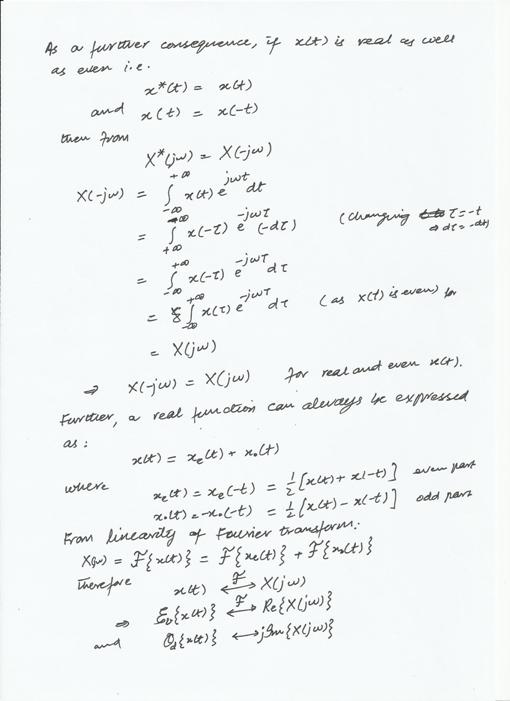
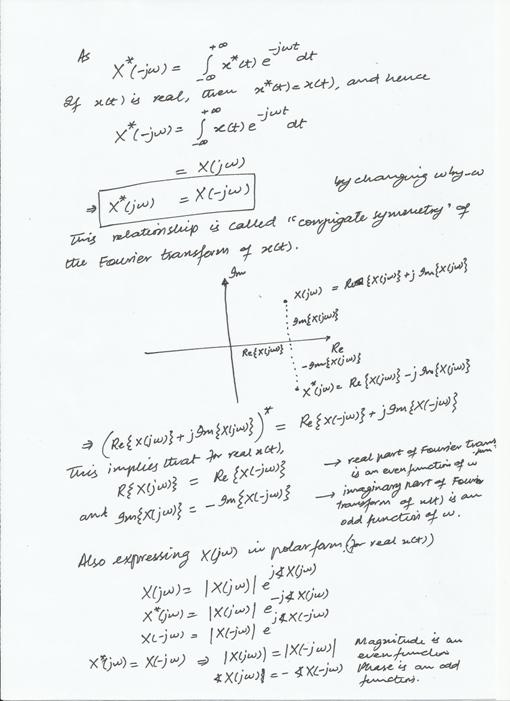
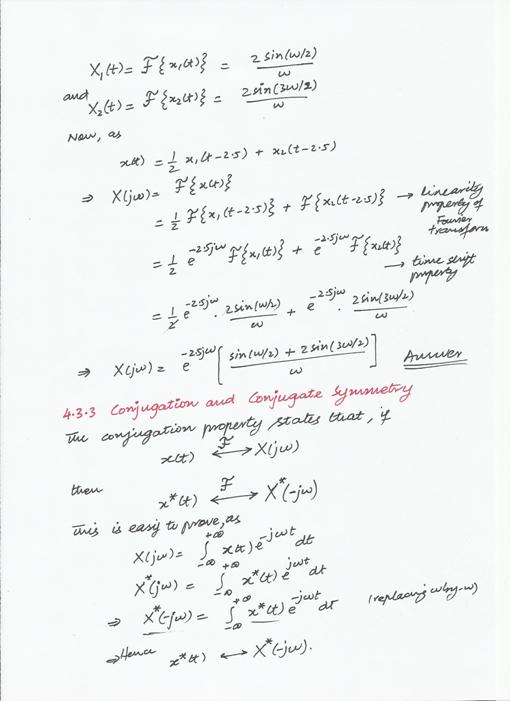
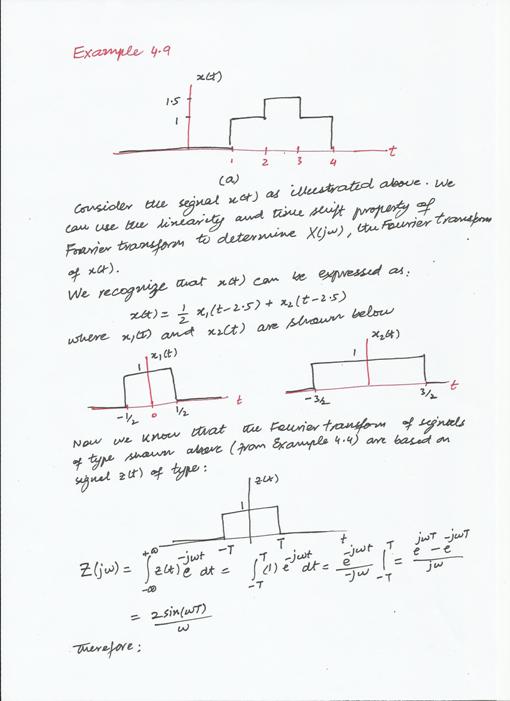
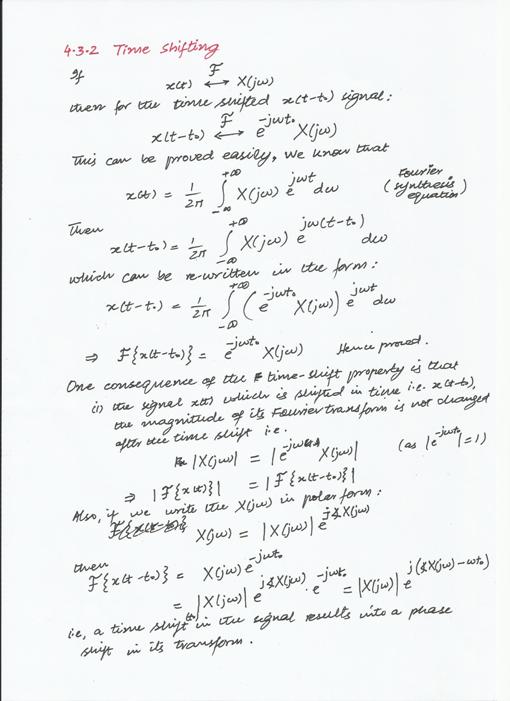
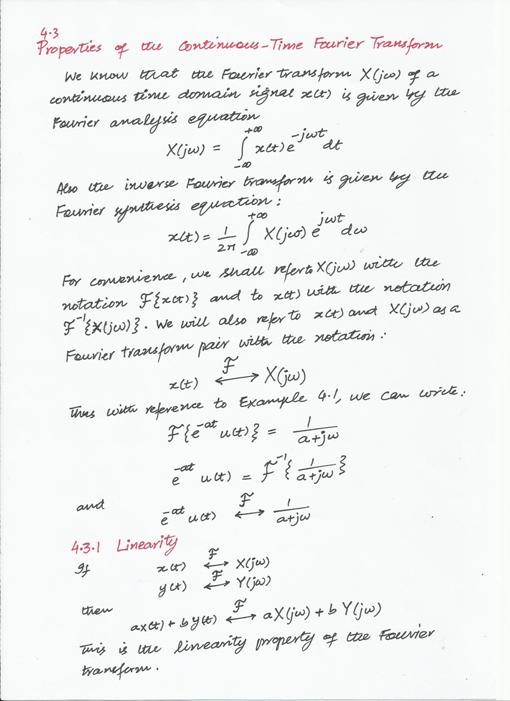
**Fourier Transform**

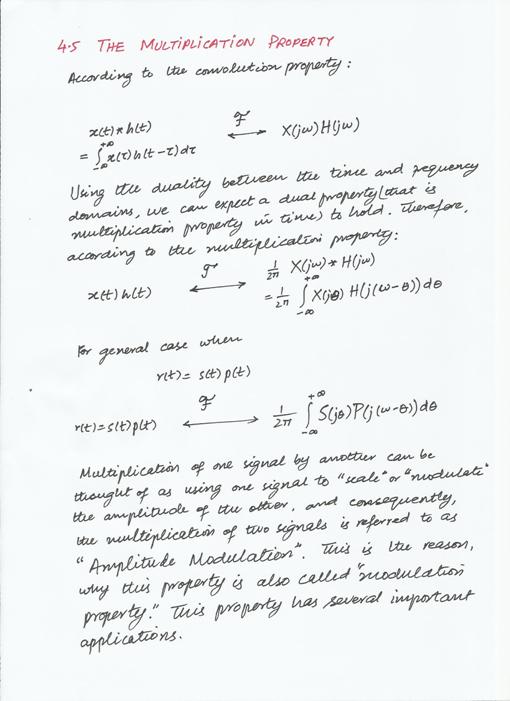
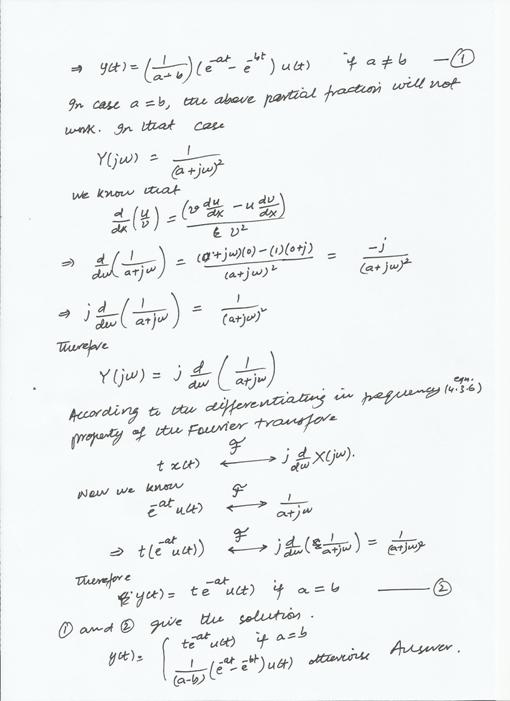
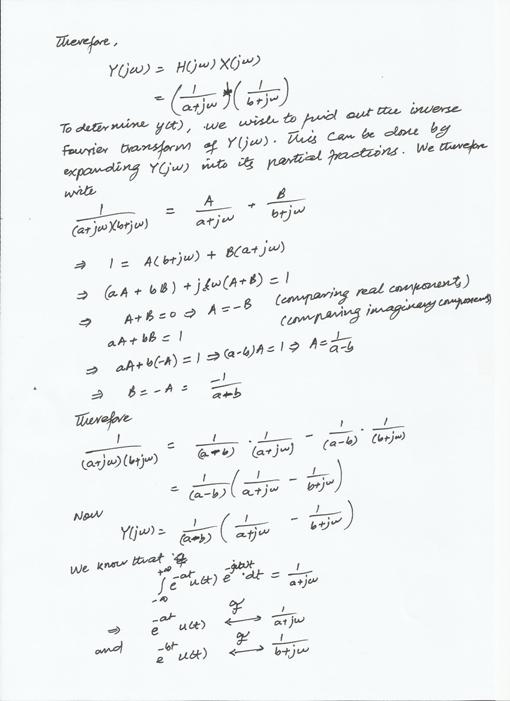
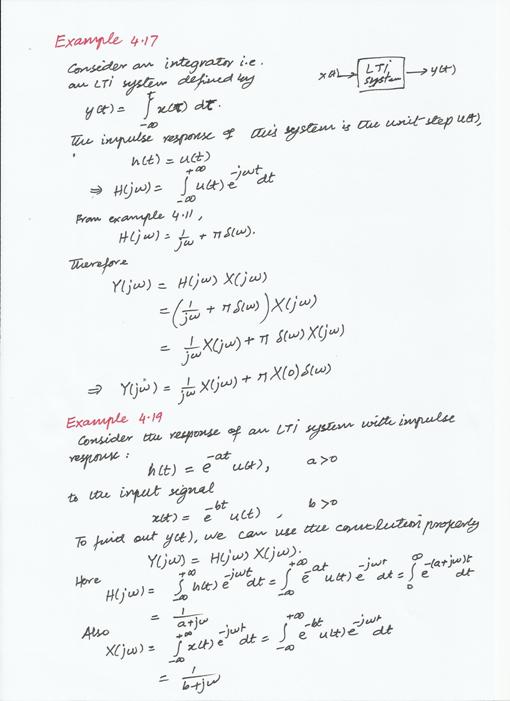
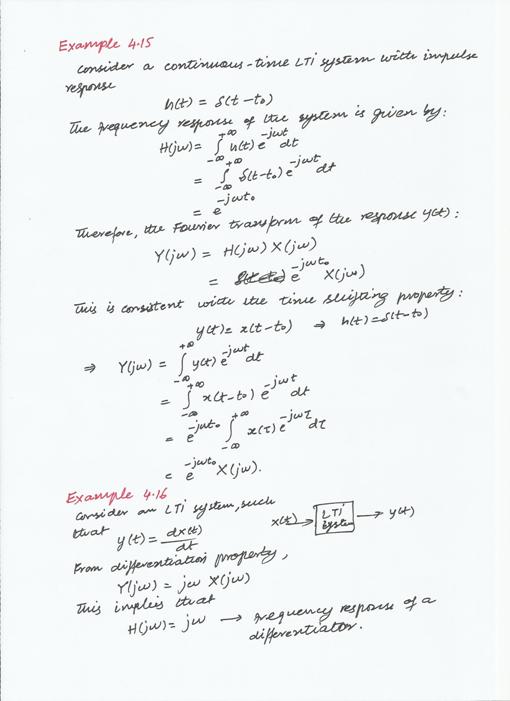
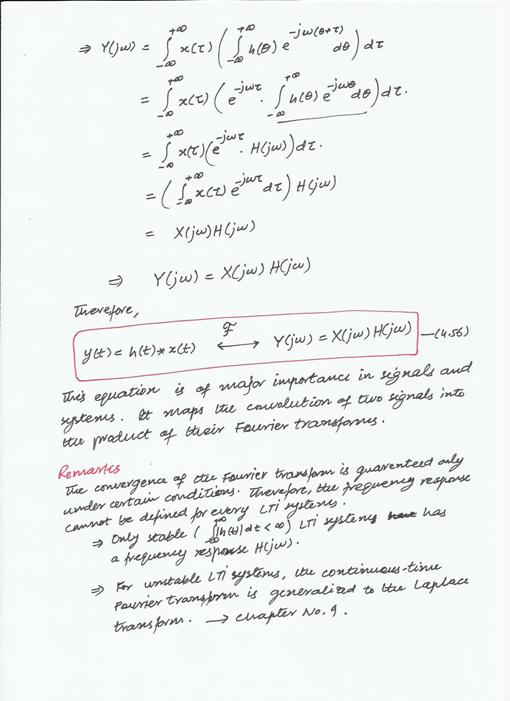
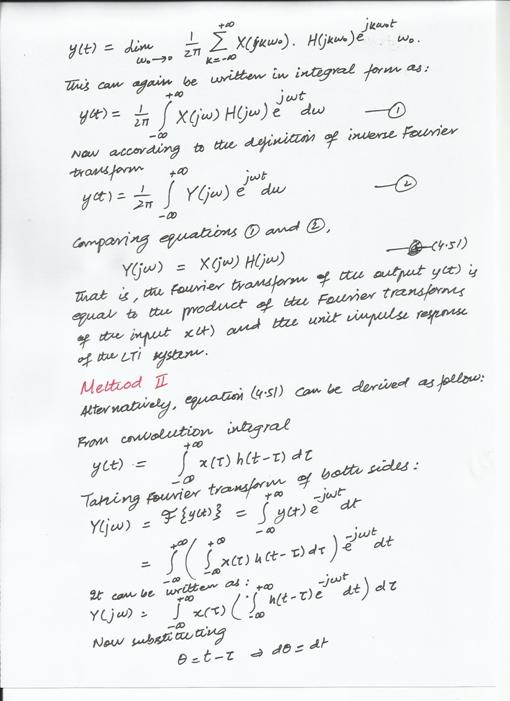
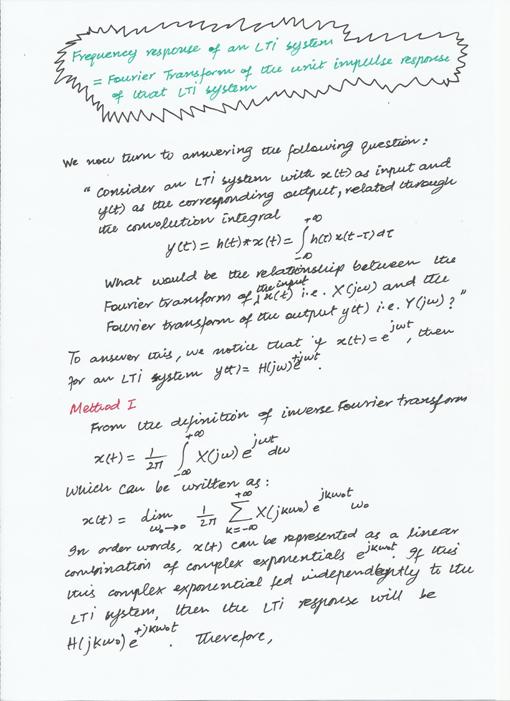
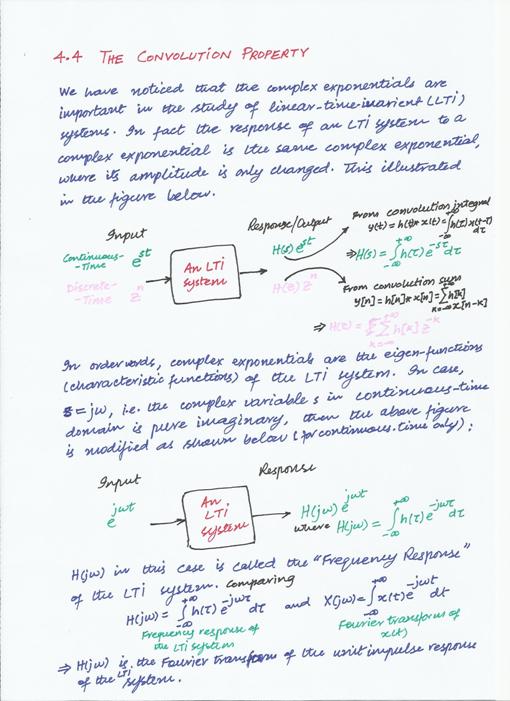
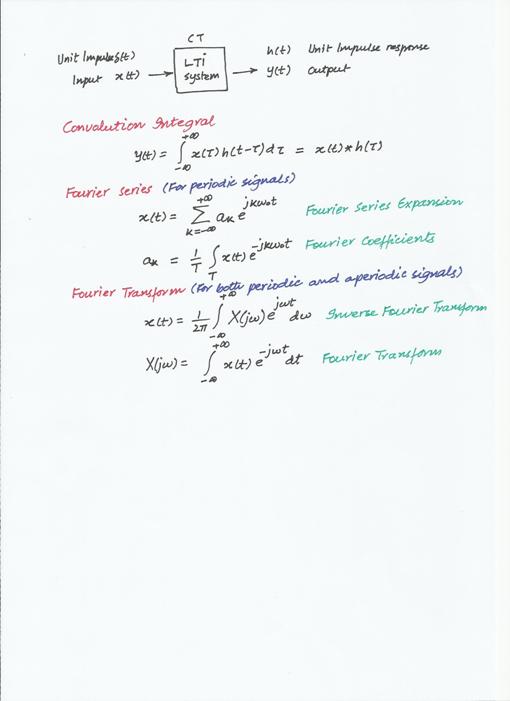
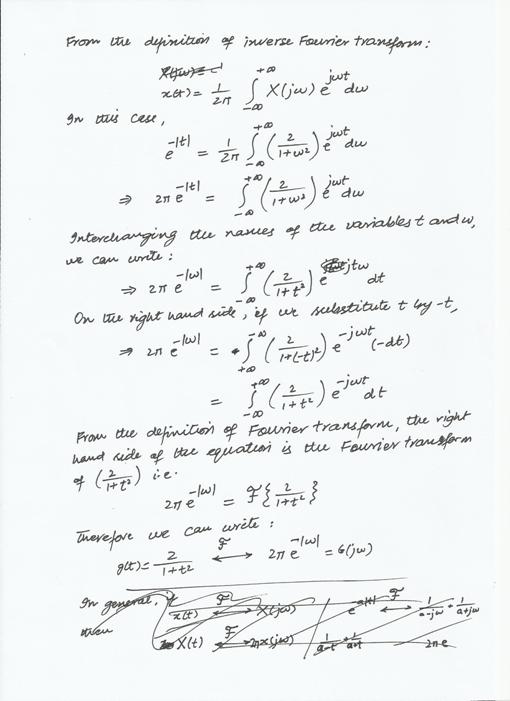
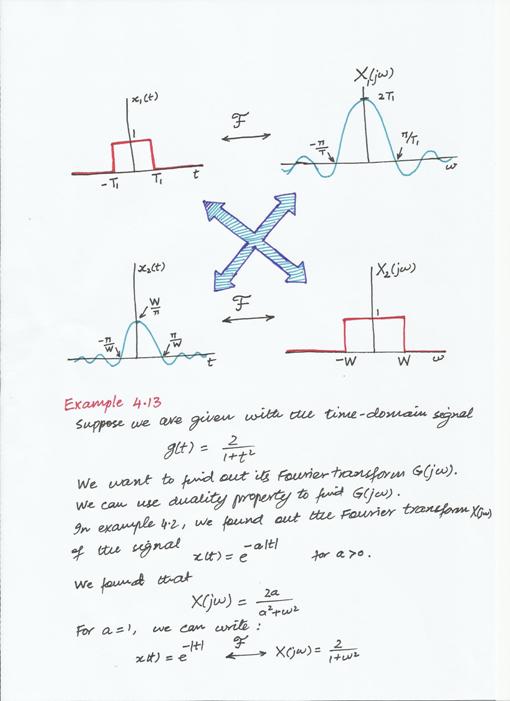
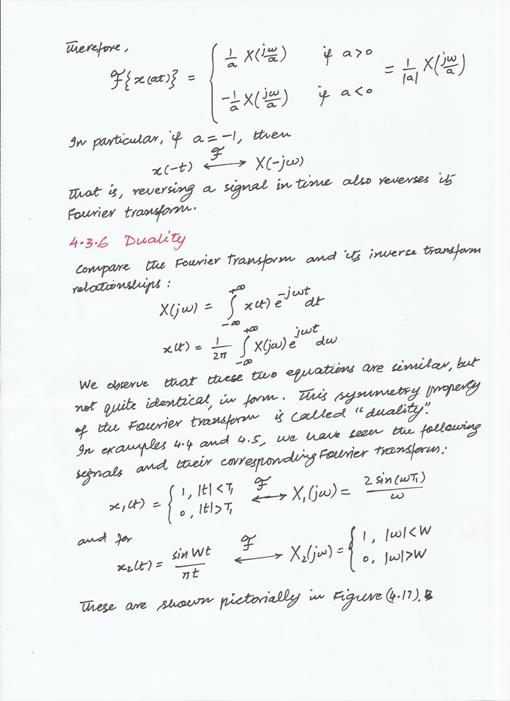
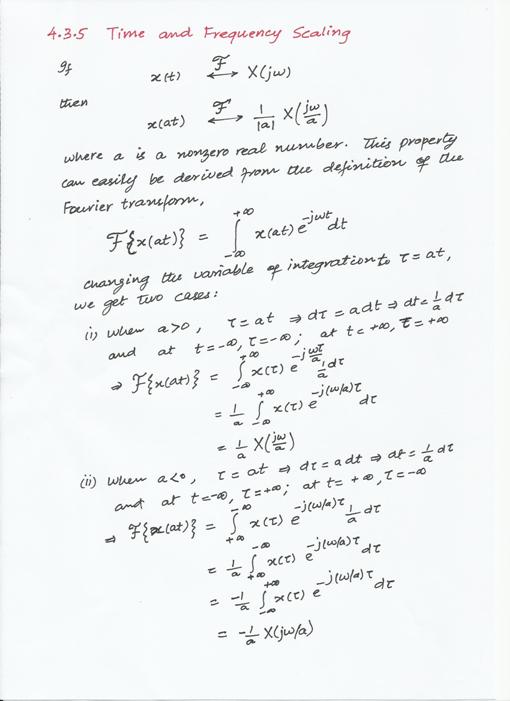
* + 1. Development of the Fourier Transform Representation of an Aperiodic Signal
    2. Convergence of Fourier Transform
    3. Examples of Continuous-Time Fourier Transform
  1. **The Fourier Transform for Periodic Signals**
  2. **Properties of Continuous-Time Fourier Transform**
     1. Linearity
     2. Time Shifting
     3. Conjugation and Conjugate Symmetry
     4. Differentiation and Integration
     5. Time and Frequency Scaling
     6. Duality
     7. Parseval’s Relation
  3. **The Convolution Property**
     1. Examples
  4. **The Multiplication Property** 
     1. Frequency-Selective Filtering with Variable Center Frequency
  5. **Tables of Fourier Properties and of Basic Fourier Transform Pairs**
  6. **Systems Characterized by Linear Constant-Coefficient Differential Equations**
  7. **Summary**











**Some Important Continuous-Time Relationships**

**Time Domain**

**: Unit Impulse Response**

**: Output**

**Unit Impulse:**

**Input:**

**Continuous-Time**

**LTI System**

**: Frequency Response**

**: Output**

**Unit Impulse:**

**Input:**

**Frequency Domain**

**Continuous-Time**

**LTI System**

**Convolution Integral**

|  |  |  |
| --- | --- | --- |
|  |  | (2.40) |

**Fourier Series (For periodic signals)**

|  |  |  |
| --- | --- | --- |
|  | **Synthesis Equation** | (3.38) |
|  | **Analysis Equation** | (3.39) |

**Fourier Transform (For both periodic and non-periodic signals)**

|  |  |  |
| --- | --- | --- |
|  | **Fourier Transform** | (4. 8) |
|  | **Inverse Fourier Transform** | (4.9) |

**TABLE 4.1** PROPERTIES OF FOURIER TRANSFORM

|  |  |  |
| --- | --- | --- |
| Property | Aperiodic Signal | Fourier Transform |
|  |  |  |
| Linearity |  |  |
| Time Shifting |  |  |
| Frequency Shifting |  |  |
| Conjugation |  |  |
| Time Reversal |  |  |
| Time and Frequency Scaling |  |  |
| Convolution |  |  |
| Multiplication |  |  |
| Differentiation |  |  |
| Integration |  |  |
| Differentiation in Frequency |  |  |
| Conjugate Symmetry for Real Signals |  |  |
| Real and Even Signals |  | real and even |
| Real and Odd Signals |  | purely imaginary and odd |
| Even-Odd Decomposition of Real Signals |  |  |
| Parseval’s Relation for Aperiodic Signals | | |

**TABLE 4.2** BASIC FOURIER TRANSFORM PAIRS

|  |  |  |
| --- | --- | --- |
| Signal | Fourier Transform | Fourier Series Coefficients (if periodic) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| Periodic square wave  and |  |  |
|  |  |  |
|  |  |  |
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|  |  |  |
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