EE 150L
Signals and Systems Lab

Lab4 Fourier Transform

Date Performed:

Class Id:

Name and Student ID:

1. The Fourier transform has many properties, pick two of the following five to verify.

1) The symmetry property, that is:

If $\mathcal{F}[\mathrm{f(t)}] = \mathrm{F}(\omega)$, then $\mathcal{F}[\mathrm{F(t)}] = 2\pi f(-\omega)$

2) The scaling property, that is:

If $\mathcal{F}[\mathrm{f(t)}] = \mathrm{F}(\omega)$, then $\mathcal{F}[\mathrm{f(at)}] = \frac{1}{|a|}F(\frac{\omega}{a})$

3) The time shifting property, that is:

If $\mathcal{F}[\mathrm{f(t)}] = \mathrm{F}(\omega)$, then $\mathcal{F}[\mathrm{f(t} - t_0)] = F(\omega)e^{-j\omega t_0}$

4) The frequency shifting property, that is:

If $\mathcal{F}[\mathrm{f(t)}] = \mathrm{F}(\omega)$, then $\mathcal{F}\left[\mathrm{f(t)}e^{\pm j\omega t_0}\right] = F(\omega \mp \omega_0)$

5) The convolution property, that is:

If $\mathcal{F}[f_1(\mathrm{t})] = \mathrm{F}_1(\omega), \mathcal{F}[f_2(\mathrm{t})] = \mathrm{F}_2(\omega)$, then $\mathcal{F}[\mathrm{f}_1(t) * \mathrm{f}_2(t)] = F_1(\omega) \cdot F_2(\omega)$

说明：任取两个性质进行证明。

2. The following signals can be obtained by convolution or linear combination of two basic signals, which we mentioned in Lab1. Try to find out the basic signals and draw them.