Homework #05

Problem 1

$$\Pi(t) \overset{CTFT}{\leftrightarrow} \text{sinc}(f)$$

$$\Lambda(t) \overset{CTFT}{\leftrightarrow} \text{sinc}^2(f)$$

Problem 2

Assume $\quad x(t) \quad \overset{CTFT}{\leftrightarrow} \quad X(f)$

Please prove the following CTFT pairs.

$$x(t-t_0) \quad \overset{CTFT}{\leftrightarrow} \quad e^{-j2\pi f t_0} X(f)$$

$$e^{+j2\pi f_0 t} x(t) \quad \overset{CTFT}{\leftrightarrow} \quad X(f - f_0)$$

$$x(at) \quad \overset{CTFT}{\leftrightarrow} \quad \frac{1}{|a|} X(\frac{f}{a})$$

Problem 3 (Matlab Exercise)

$t = -10:0.01:10$

$f_s = 1$

$f_o = 0.1$

$x(t) = \sin(2\pi f_o t)$

(a) Plot $x(t)$ and $x[n]$ in Fig. 1.

(b) Plot $x(t)$ and $x_r(t)$ in Fig. 2.

(P.S. $x_r(t)$ is the perfect reconstruction of $x[n]$.)