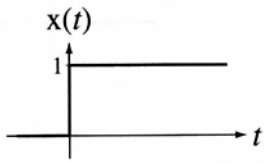
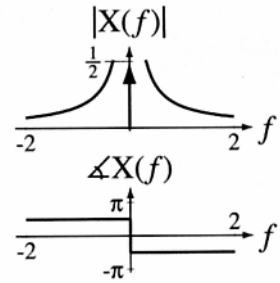
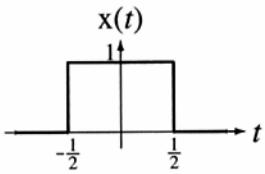
Continuous-Time Fourier Transform Pairs

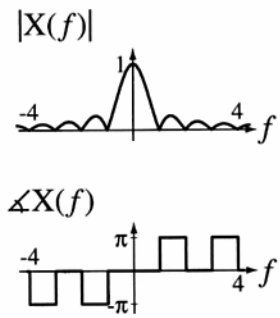


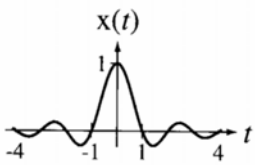
$$u(t) \xleftrightarrow{\mathcal{F}} (1/2)\delta(f) + 1/j2\pi f$$



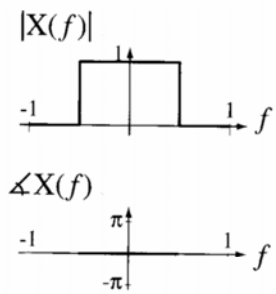


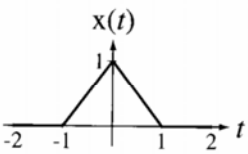
$$\mathrm{rect}(t) \xleftrightarrow{\mathcal{F}} \mathrm{sinc}(f)$$



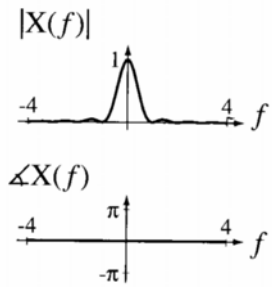


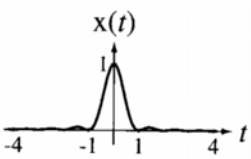
$$\mathrm{sinc}(t) \xleftrightarrow{\mathcal{F}} \mathrm{rect}(f)$$



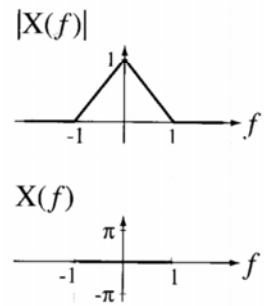


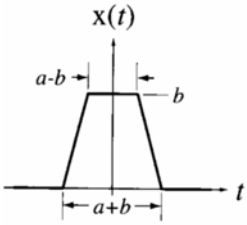
$$\mathrm{tri}(t) \xleftrightarrow{\mathcal{F}} \mathrm{sinc}^2(f)$$





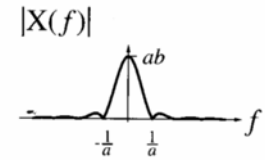
$$\mathrm{sinc}^2(t) \xleftrightarrow{\mathcal{F}} \mathrm{tri}(f)$$

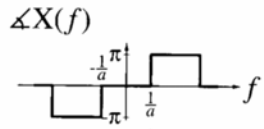


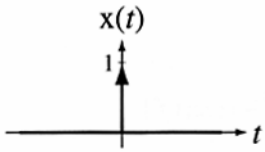


$$\frac{a+b}{2}\,\mathrm{tri}\left(\frac{2t}{a+b}\right)-\frac{a-b}{2}\,\mathrm{tri}\left(\frac{2t}{a-b}\right)\xleftrightarrow{\mathcal{F}}ab\,\mathrm{sinc}(af)\,\mathrm{sinc}(bf)$$

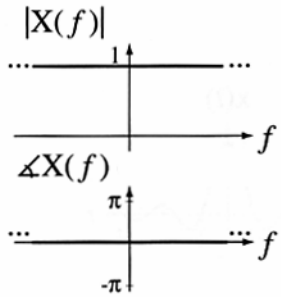
$$a > b > 0$$

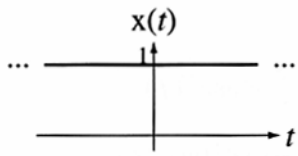




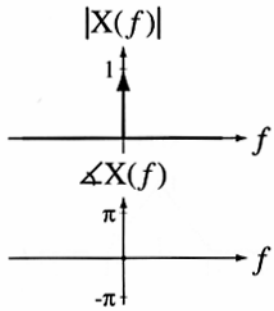


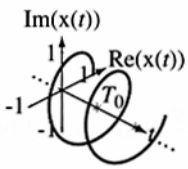
$$\delta(t)\xleftrightarrow{\mathcal{F}}1$$



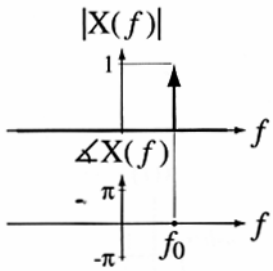


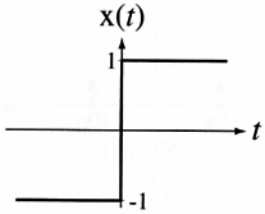
$$1\xleftrightarrow{\mathcal{F}}\delta(f)$$



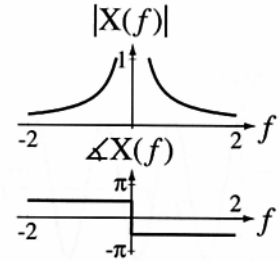


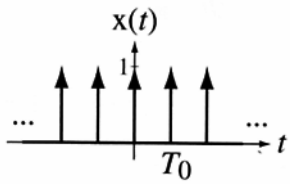
$$e^{j2\pi f_0 t}\xleftrightarrow{\mathcal{F}}\delta(f-f_0)$$





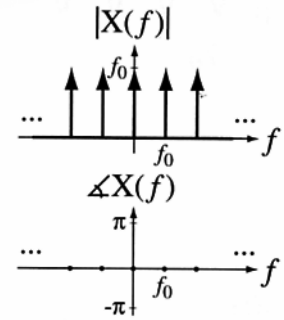
$$\mathrm{sgn}(t) \xleftrightarrow{\mathcal{F}} 1/j\pi f$$

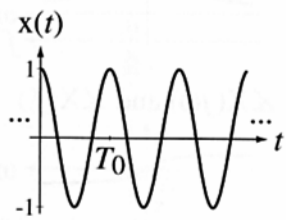




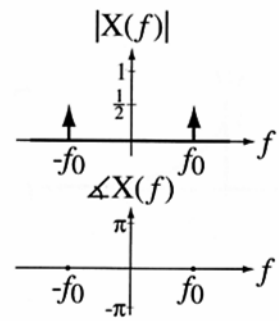
$$\delta_{T_0}(t) \xleftrightarrow{\mathcal{F}} f_0\delta_{f_0}(f)$$

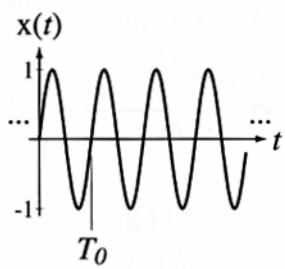
$$f_0 = 1/T_0$$



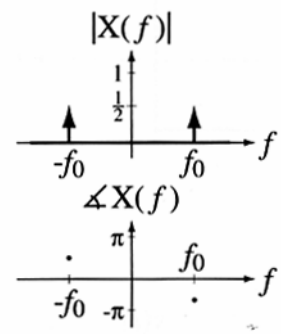


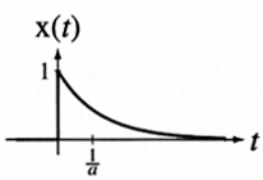
$$\cos(2\pi f_0 t) \xleftrightarrow{\mathcal{F}} \frac{1}{2}\left[\delta(f-f_0)+\delta(f+f_0)\right]$$



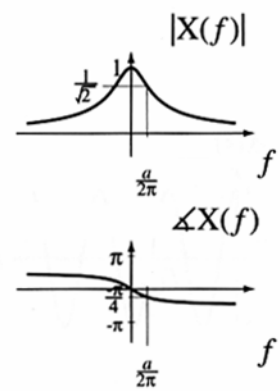


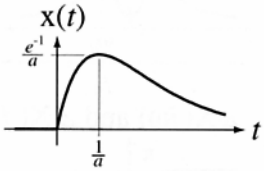
$$\sin(2\pi f_0 t) \xleftrightarrow{\mathcal{F}} \frac{j}{2}\left[\delta(f+f_0)-\delta(f-f_0)\right]$$



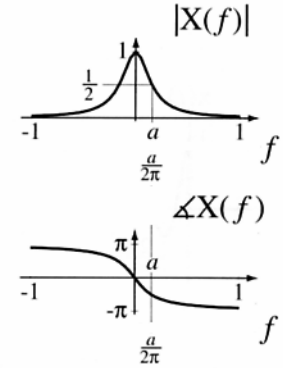


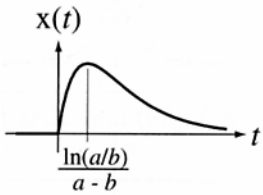
$$e^{-at}\,\mathrm{u}(t) \xleftrightarrow{\mathcal{F}} \frac{1}{j2\pi f + a}\ ,\ \mathrm{Re}(a) > 0$$



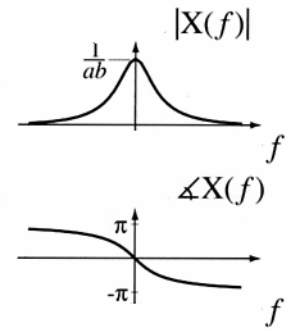


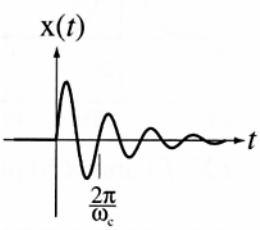
$$te^{-at}\,\mathrm{u}(t) \xleftrightarrow{\mathcal{F}} \frac{1}{(j2\pi f + a)^2}\ ,\ \mathrm{Re}(a) > 0$$





$$\frac{e^{-at} - e^{-bt}}{b-a}\,\mathrm{u}(t) \xleftrightarrow{\mathcal{F}} \frac{1}{(j2\pi f + a)(j2\pi f + b)}\ ,\ \begin{array}{c}\mathrm{Re}(a) > 0\\ \mathrm{Re}(b) > 0\\ a \neq b\end{array}$$

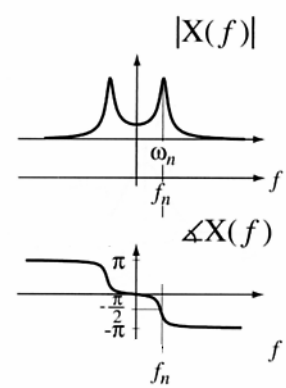


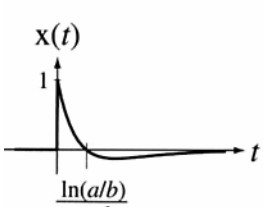


$$e^{-\alpha t}\sin(\omega_c t)\,\mathrm{u}(t) \xleftrightarrow{\mathcal{F}} \frac{\omega_c}{(j\omega + \alpha)^2 + \omega_c^2}$$

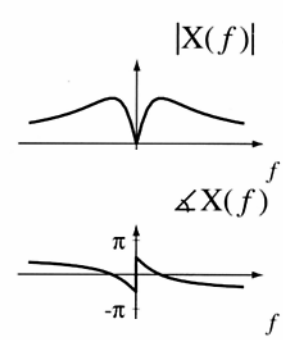
$$e^{-\zeta\omega_n t}\sin\left(\omega_n\sqrt{1-\zeta^2}\,t\right)\mathrm{u}(t) \xleftrightarrow{\mathcal{F}} \frac{\omega_c}{(j\omega)^2 + j\omega(2\zeta\omega_n) + \omega_n^2}$$

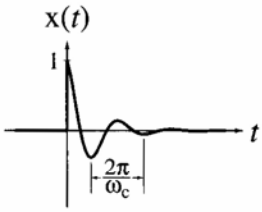
$$\left(\omega_c = \omega_n\sqrt{1-\zeta^2}\ \ ,\ \ \alpha = \zeta\omega_n\right)$$





$$\frac{ae^{-at} - be^{-bt}}{a-b}\,\mathrm{u}(t) \xleftrightarrow{\mathcal{F}} \frac{j2\pi f}{(j2\pi f + a)(j2\pi f + b)}\ ,\ \begin{array}{c}\mathrm{Re}(a) > 0\\ \mathrm{Re}(b) > 0\\ a \neq b\end{array}$$

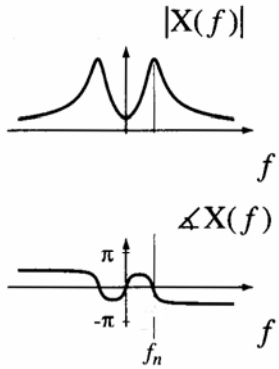


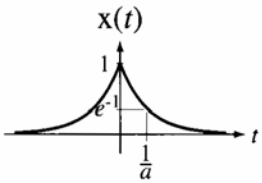


$$e^{-\alpha t}\cos(\omega_c t)\,u(t) \xleftrightarrow{\mathcal{F}} \frac{j\omega+\alpha}{(j\omega+\alpha)^2+\omega_c^2}$$

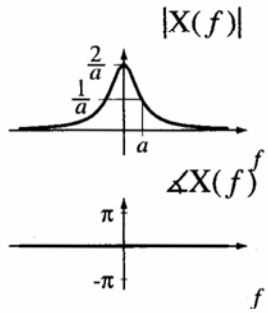
$$e^{-\zeta\omega_n t}\cos\left(\omega_n\sqrt{1-\zeta^2}\,t\right)u(t) \xleftrightarrow{\mathcal{F}} \frac{j\omega+\zeta\omega_n}{(j\omega)^2+j\omega(2\zeta\omega_n)+\omega_n^2}$$

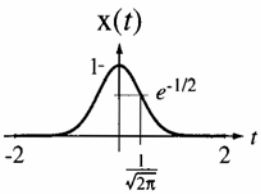
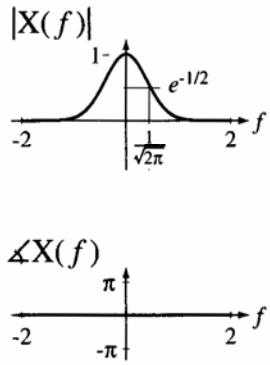
$$\left(\omega_c=\omega_n\sqrt{1-\zeta^2}\quad,\quad \alpha=\zeta\omega_n\right)$$





$$e^{-a|t|} \xleftrightarrow{\mathcal{F}} \frac{2a}{(2\pi f)^2+a^2}\quad,\quad \mathrm{Re}(a)>0$$





$$e^{-\pi t^2} \xleftrightarrow{\mathcal{F}} e^{-\pi f^2}$$