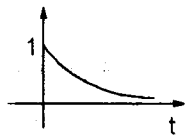
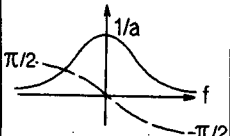
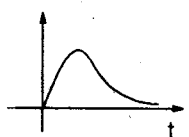
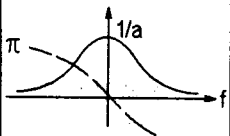
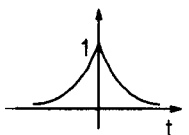
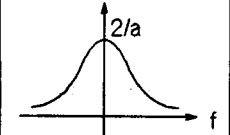
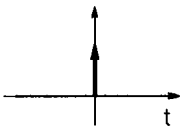
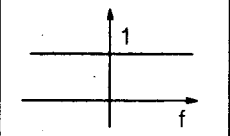
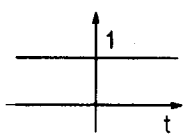
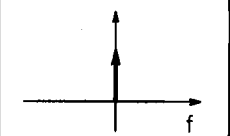
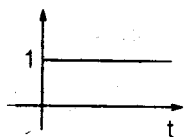
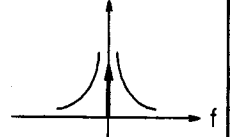
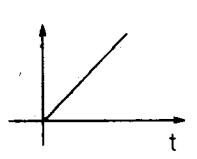
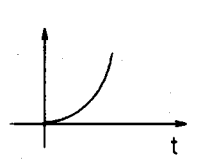
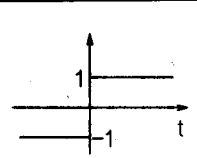
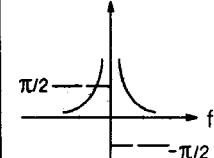
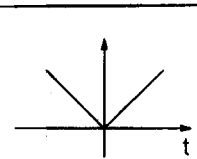
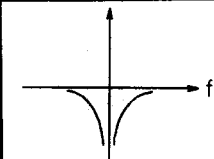
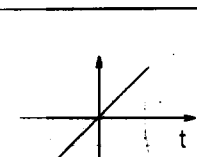
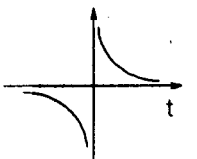
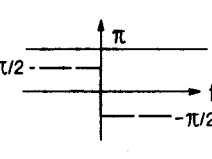
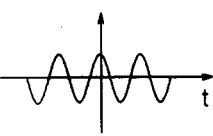
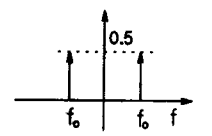
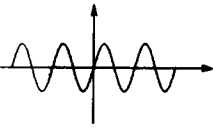
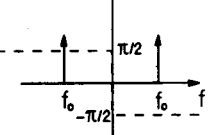
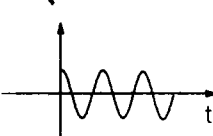
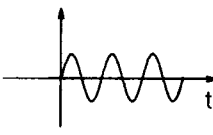
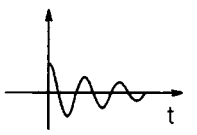


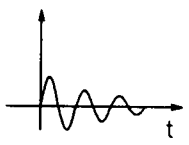
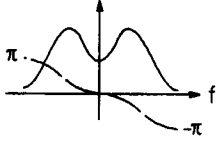
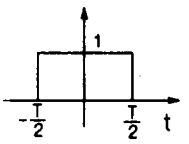
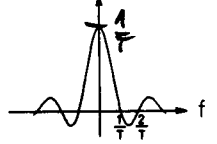
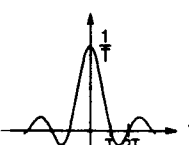
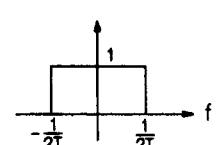
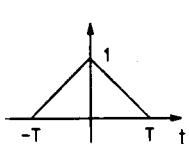
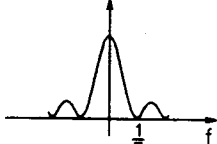
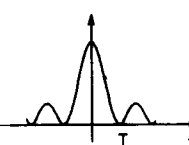
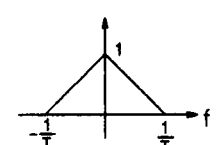
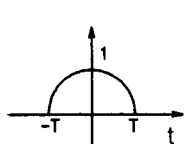
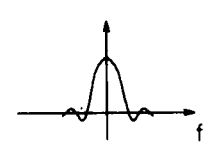
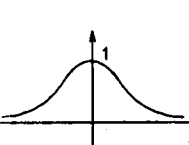
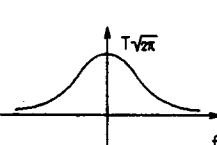
Proprietà	Segnale	Trasformata di Fourier
	$x(t) = \int_{-\infty}^{+\infty} X(f)e^{+j2\pi ft} df$	$X(f) = \int_{-\infty}^{+\infty} x(t)e^{-j2\pi ft} dt$
	$y(t) = \int_{-\infty}^{+\infty} Y(f)e^{+j2\pi ft} df$	$Y(f) = \int_{-\infty}^{+\infty} y(t)e^{-j2\pi ft} dt$
linearità	$ax(t) + by(t)$	$aX(f) + bY(f)$
inversione assi	$x(-t)$	$X(-f)$
coniugazione	$x^*(t)$	$X^*(-f)$
anticipo o ritardo	$x(t \pm \theta)$	$X(f)e^{\pm j2\pi f\theta}$
scalamento in t	$x(kt)$	$\frac{1}{ k }X\left(\frac{f}{k}\right)$
scalamento in f	$\frac{1}{ k }x\left(\frac{t}{k}\right)$	$X(kf)$
parità	$x(t)$ reale	$\mathcal{R}\{X(f)\}$ pari
	$x(t)$ reale	$\mathcal{I}\{X(f)\}$ dispari
	$x(t)$ reale	$ X(f) $ pari
	$x(t)$ reale	$\arg\{X(f)\}$ dispari
	$x(t)$ reale e pari	$X(f)$ reale e pari
traslazione in f	$x(t)e^{\pm j2\pi f_0 t}$	$X(f \mp f_0)$
modulazione	$x(t) \cos(2\pi f_0 t)$	$\frac{1}{2}[X(f - f_0) + X(f + f_0)]$
convoluzione	$\int_{-\infty}^{+\infty} x(\tau)y(t - \tau) d\tau$	$X(f)Y(f)$
prodotto	$x(t)y(t)$	$\int_{-\infty}^{+\infty} X(a)Y(f - a) da$
derivazione	$\dot{x}(t)$	$j2\pi fX(f)$
integrazione	$\int_{-\infty}^t x(\tau) d\tau$	$\frac{1}{2}X(0)\delta(f) + X(f)/j2\pi f$
dualità	$X(t)$	$x(-f)$

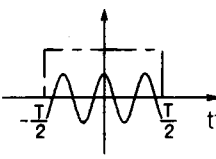
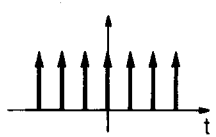
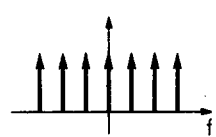
Tabella 4.1 - Proprietà della trasformata di Fourier

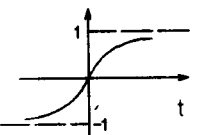
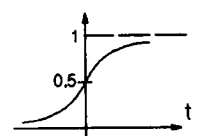
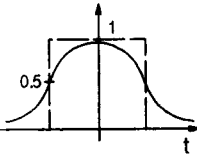
	Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$
1		$e^{-at}u(t)$ ($a > 0$)	$\frac{1}{a + j2\pi f}$ 
2		$ate^{-at}u(t)$ ($a > 0$)	$\frac{a}{(a + j2\pi f)^2}$ 
3		$e^{-a t }$ ($a > 0$)	$\frac{2a}{a^2 + 4\pi^2 f^2}$ 
4		$\delta(t)$	1 
5		1	$\delta(f)$ 
6		$\delta^{(n)}(t)$	$(j2\pi f)^n$
7		$u(t) = \begin{cases} 1, & t > 0 \\ 0, & t < 0 \end{cases}$	$\frac{1}{j2\pi f} + \frac{\delta(f)}{2}$ 

Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$	
8	 $tu(t) = \begin{cases} t, & t > 0 \\ 0, & t < 0 \end{cases}$	$\frac{-1}{(2\pi f)^2} + \frac{\delta(f)}{j4\pi f}$ $= \frac{1}{(j2\pi f)^2} + \frac{j\delta'(f)}{4\pi}$	
9	 $t^n u(t) = \begin{cases} t^n, & t > 0 \\ 0, & t < 0 \end{cases}$	$\frac{n!}{(j2\pi f)^{n+1}} + \frac{\delta(f)n!}{2(j2\pi f)^n}$ $= \frac{n!}{(j2\pi f)^{n+1}} + j^n \frac{\delta^{(n)}(f)}{2(2\pi)^n}$	
10	 $\text{sgn}(t) = \begin{cases} 1, & t > 0 \\ 0, & t = 0 \\ -1, & t < 0 \end{cases}$	$\frac{1}{j\pi f}$	
11	 $ t $	$-\frac{1}{2\pi^2 f^2}$	
12	 t	$j \frac{\delta'(f)}{2\pi}$	
13	t^n $n \text{ intero } \geq 0$	$\frac{j^n \delta^{(n)}(f)}{(2\pi)^n}$	
14	$ t^n $ $n \text{ dispari}$	$\frac{2n!}{(j2\pi f)^{n+1}}$	

	Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$	
15		$\frac{1}{t}$	$\frac{\pi}{j} \operatorname{sgn}(f) = \begin{cases} -j\pi, & f > 0 \\ 0, & f = 0 \\ j\pi, & f < 0 \end{cases}$	
16		t^{-m} m intero ≥ 0	$\frac{(-j)^m \pi (2\pi f)^{m-1} \operatorname{sgn}(f)}{(m-1)!}$	
17		$\cos(2\pi f_0 t)$	$\frac{1}{2} [\delta(f - f_0) + \delta(f + f_0)]$	
18		$\sin(2\pi f_0 t)$	$\frac{1}{2j} [\delta(f - f_0) - \delta(f + f_0)]$	
19		$u(t) \cos(2\pi f_0 t)$	$\frac{jf}{2\pi(f_0^2 - f^2)} + \frac{1}{4} [\delta(f - f_0) + \delta(f + f_0)]$	
20		$u(t) \sin(2\pi f_0 t)$	$\frac{f_0}{2\pi(f_0^2 - f^2)} + \frac{1}{4j} [\delta(f - f_0) - \delta(f + f_0)]$	
21		$u(t)e^{-at} \cos(2\pi f_0 t),$ $a > 0$	$\frac{a + j2\pi f}{(a + j2\pi f)^2 + 4\pi^2 f_0^2}$	

Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$	
22	 $u(t)e^{-at} \sin(2\pi f_0 t),$ $a > 0$	$\frac{2\pi f_0}{(a + j2\pi f)^2 + 4\pi^2 f_0^2}$	
23	 $p_T(t) = \begin{cases} 1, & t < T/2 \\ 0, & t > T/2 \end{cases}$	$T \operatorname{Sinc}(fT)$ $= \frac{\sin(\pi fT)}{\pi f}$	
24	 $\frac{1}{T} \operatorname{Sinc}(t/T) = \frac{\sin(\pi t/T)}{\pi t}$	$p_{1/T}(f) = \begin{cases} 1, & f < 1/2T \\ 0, & f > 1/2T \end{cases}$	
25	 $\operatorname{tri}(t/T) = \begin{cases} 1 - t /T, & t < T \\ 0, & t > T \end{cases}$	$T \operatorname{Sinc}^2(fT)$ $= T \frac{\sin^2(\pi fT)}{(\pi fT)^2}$	
26	 $\frac{1}{T} \operatorname{Sinc}^2(t/T) = T \left[\frac{\sin(\pi t/T)}{\pi t} \right]^2$	$\operatorname{tri}(fT) = \begin{cases} 1 - f T, & f < 1/T \\ 0, & f > 1/T \end{cases}$	
27	 $\sqrt{1 - (t/T)^2}, \quad t < T$ $0, \quad t > T$	$\frac{J_1(2\pi fT)}{2f}$	
28	 $e^{-t^2/2T^2}$	$T\sqrt{2\pi}e^{-2\pi^2 f^2 T^2}$	

	Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$		
29		$p_T(t) \cos(2\pi f_0 t) = \begin{cases} \cos(2\pi f_0 t), & t < T/2 \\ 0, & t > T/2 \end{cases}$	$\frac{T}{2} \{ \text{Sinc}[(f - f_0)T] + \text{Sinc}[(f + f_0)T] \}$	36	
30		$t^n e^{\mp j2\pi f_0 t},$ n intero > 0	$\frac{j^n \delta^{(n)}(f \mp f_0)}{(2\pi)^n}$	37	
31		$t^n \sin(2\pi f_0 t),$ n intero > 0	$\frac{j^{n-1}}{2(2\pi)^n} [\delta^{(n)}(f - f_0) - \delta^{(n)}(f + f_0)]$	38	
32		$t^n \cos(2\pi f_0 t)$ n intero > 0	$\frac{j^n}{2(2\pi)^n} [\delta^{(n)}(f - f_0) + \delta^{(n)}(f + f_0)]$	39	
33		$\sum_{n=-\infty}^{+\infty} g(t - nT)$	$\frac{1}{T} \sum_{n=-\infty}^{+\infty} G\left(\frac{n}{T}\right) \delta\left(f - \frac{n}{T}\right)$	40	
34		$\sum_{n=-\infty}^{+\infty} g(nT) \delta(t - nT)$	$\frac{1}{T} \sum_{n=-\infty}^{+\infty} G\left(f - \frac{n}{T}\right)$	41	
35		$\sum_{n=-\infty}^{+\infty} \delta(t - nT)$	$\frac{1}{T} \sum_{n=-\infty}^{+\infty} \delta\left(f - \frac{n}{T}\right)$		42

Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$	
36	$m(t) \sum_{n=-\infty}^{+\infty} g(t-nT)$	$\frac{1}{ T } \sum_{n=-\infty}^{+\infty} G\left(\frac{n}{T}\right) M\left(f-\frac{n}{T}\right)$	
37	$\sum_{n=-\infty}^{+\infty} g(nT)m(t-nT)$	$\frac{1}{ T } M(f) \sum_{n=-\infty}^{+\infty} G\left(f-\frac{n}{T}\right)$	
38	 $\operatorname{erf}(\alpha t) = \frac{2}{\sqrt{\pi}} \int_0^{\alpha t} e^{-y^2} dy$	$\frac{e^{-(\pi f/\alpha)^2}}{j\pi f}$	
39	 $\frac{1}{2} + \frac{1}{2} \operatorname{erf}\left(\frac{\alpha t}{2}\right)$	$\frac{\delta(f)}{2} + \frac{e^{-(2\pi f/\alpha)^2}}{j2\pi f}$	
40	 $\frac{1}{2} \left\{ \operatorname{erf}\left[\frac{\alpha}{2} \left(t + \frac{T}{2}\right)\right] - \operatorname{erf}\left[\frac{\alpha}{2} \left(t - \frac{T}{2}\right)\right] \right\}$	$\frac{\sin(\pi f T) e^{-(2\pi f/\alpha)^2}}{\pi f}$	
41	$e^{2\pi \alpha t}$, α reale o complesso	$\delta(f + j\alpha)$	
42	$\sinh(2\pi \alpha t)$	$\frac{1}{2} [\delta(f + j\alpha) - \delta(f - j\alpha)]$	

Funzione del tempo $x(t)$		Funzione della frequenza $X(f)$	
43	$\cosh(2\pi at)$	$\frac{1}{2}[\delta(f + j\alpha) + \delta(f - j\alpha)]$	
44	$i^n e^{2\pi at}$	$\frac{j^n}{(2\pi)^n} \delta^{(n)}(f + j\alpha)$	
45	$e^{\alpha t} u(t),$ α reale o complesso $\mathcal{R}\{\alpha\} > 0$	$\frac{1}{j2\pi f - \alpha} + \frac{\delta(f + j\frac{\alpha}{2\pi})}{2}$	