

Formula di Eulero:

$$e^{j\alpha} = \cos \alpha + j \sin \alpha \quad \cos \alpha = \frac{e^{j\alpha} + e^{-j\alpha}}{2}, \quad \sin \alpha = \frac{e^{j\alpha} - e^{-j\alpha}}{2j}$$

$$\cos \alpha \cos \beta = \frac{1}{2} [\cos(\alpha - \beta) + \cos(\alpha + \beta)]$$

Formule di Werner:

$$\sin \alpha \sin \beta = \frac{1}{2} [\cos(\alpha - \beta) - \cos(\alpha + \beta)]$$

$$\sin \alpha \cos \beta = \frac{1}{2} [\sin(\alpha - \beta) + \sin(\alpha + \beta)]$$

Proprietà trasformata di Fourier:

1. linearità $a x(t) + b y(t) \Leftrightarrow a X(f) + b Y(f)$
2. simmetria $x^*(t) \Leftrightarrow X^*(-f), \quad x(-t) \Leftrightarrow X(-f)$
3. valori nell'origine $X(0) = \int_{-\infty}^{+\infty} x(t) dt, \quad x(0) = \int_{-\infty}^{+\infty} X(f) df,$
4. dualità $X(t) \Leftrightarrow x(-f)$
5. scalatura $x(at) \Leftrightarrow \frac{1}{|a|} X\left(\frac{f}{a}\right)$
6. traslazione nei tempi $x(t - t_0) \Leftrightarrow X(f) \exp(-j2\pi f t_0)$
7. traslazione in frequenza $x(t) \exp(j2\pi f_0 t) \Leftrightarrow X(f - f_0)$
8. derivazione $\frac{dx(t)}{dt} \Leftrightarrow j2\pi f X(f)$
9. convoluzione $x_1(t) * x_2(t) \Leftrightarrow X_1(f) X_2(f) \quad \left[x_1(t) * x_2(t) = \int_{-\infty}^{+\infty} x_1(\tau) x_2(t - \tau) d\tau \right]$
10. moltiplicazione $x_1(t) x_2(t) \Leftrightarrow X_1(f) * X_2(f)$
11. Parseval $\int_{-\infty}^{+\infty} |x(t)|^2 dt = \int_{-\infty}^{+\infty} |X(f)|^2 df$

Trasformate notevoli

$$1. \quad A \operatorname{rect}\left(\frac{t}{T}\right) \Leftrightarrow AT \operatorname{sinc}(fT); \quad \left[\operatorname{sinc}(x) = \frac{\operatorname{sen}(\pi x)}{\pi x} \right]$$

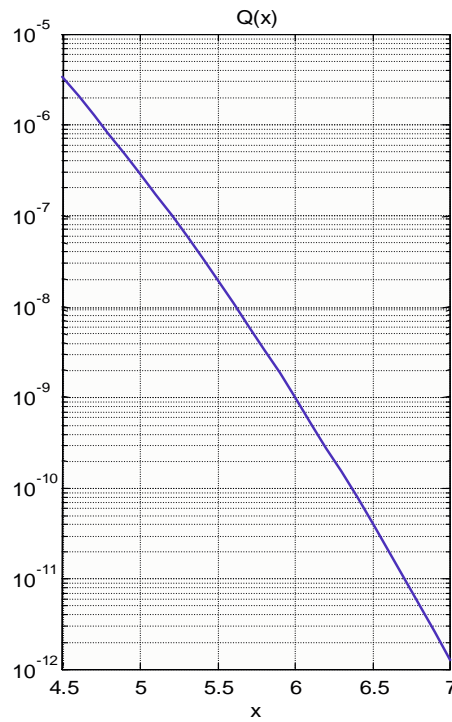
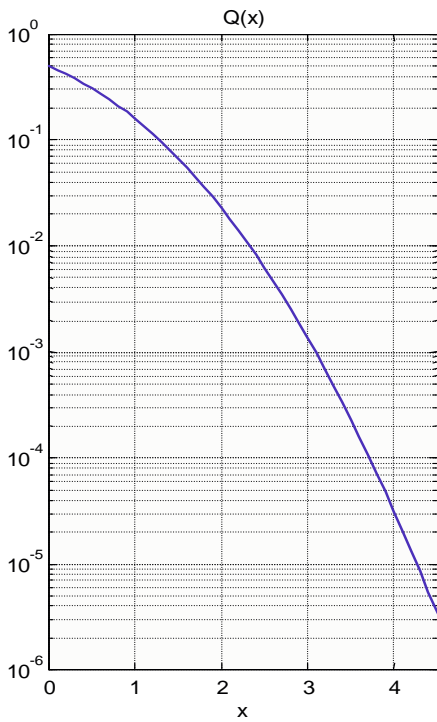
$$3. \quad A \operatorname{tri}\left(\frac{t}{T}\right) \Leftrightarrow AT \operatorname{sinc}^2(fT);$$

$$4. \quad \delta(t) \Leftrightarrow 1$$

$$5. \quad A \cos(2\pi f_0 t + \varphi) \Leftrightarrow \frac{A}{2} (\delta(f - f_0) e^{j\varphi} + \delta(f + f_0) e^{-j\varphi}).$$

$$6. \quad \exp(-\pi t^2) \Leftrightarrow \exp(-\pi f^2)$$

Funzione Q:



x	$Q(x)$
0,00	5,000E-01
0,05	4,801E-01
0,10	4,602E-01
0,15	4,404E-01
0,20	4,207E-01
0,25	4,013E-01
0,30	3,821E-01
0,35	3,622E-01
0,40	3,446E-01
0,45	3,264E-01
0,50	3,085E-01
0,60	2,743E-01
0,8	2,119E-01
1,0	1,587E-01
1,2	1,151E-01
1,4	8,080E-02
1,6	3,806E-01
1,8	3,590E-02
2,0	2,280E-02
2,4	8,200E-03
2,8	2,600E-03
3,2	6,871E-04
3,6	1,591E-04
4,0	3,167E-05

