TABLE OF FOURIER TRANSFORMS

1. Functions of a Single Variable

Entry no.	Generalized function f	Fourier transform $F[f]$
1	Ordinary summable function $f(x)$	$F[f] = \int_{-\infty}^{\infty} f(x)\, e^{ix\sigma}\, dx$
2	$\delta(x)$	1
3	1	$2\pi\, \delta(\sigma)$
4	Polynomial $P(x)$	$2\pi P\left(-i \frac{d}{d\sigma}\right) \delta(\sigma)$
5	$\delta^{(2m)}(x)$	$(-1)^m \sigma^{2m}$
6	$\delta^{(2m+1)}(x)$	$(-1)^{m+1}\, i\sigma^{2m+1}$
7	e^{bx}	$2\pi\, \delta(s - ib)$
8	$\sin bx$	$-i\pi[\delta(s + b) - \delta(s - b)]$
9	$\cos bx$	$\pi[\delta(s + b) + \delta(s - b)]$
10	$\sinh bx$	$\pi[\delta(s - ib) - \delta(s + ib)]$
11	$\cosh bx$	$\pi[\delta(s - ib) + \delta(s + ib)]$
12	$\exp\left(\frac{x^2}{2}\right)$	Analytic functional $i\sqrt{2\pi}\exp(s^2/2)$ (integration along the imaginary axis)
13	$\lvert x \rvert^\lambda \quad (\lambda \neq -1, -3, \ldots)$	$-2 \sin \frac{\lambda\pi}{2}\, \Gamma(\lambda + 1) \lvert \sigma \rvert^{-\lambda-1}$
14	$f_\lambda(x) = 2^{-\frac{1}{2}\lambda} \frac{\lvert x \rvert^\lambda}{\Gamma\left(\frac{\lambda+1}{2}\right)}$	$\sqrt{2\pi} f_{-\lambda-1}(\sigma) = \sqrt{2\pi}\, \frac{2^{\frac{1}{2}(\lambda+1)} \lvert \sigma \rvert^{-\lambda-1}}{\Gamma\left(-\frac{\lambda}{2}\right)}$
15	$\lvert x \rvert^\lambda \operatorname{sgn} x$ $(\lambda \neq -2, -4, \ldots)$	$2i \cos \frac{\lambda\pi}{2}\, \Gamma(\lambda + 1) \lvert \sigma \rvert^{-\lambda-1} \operatorname{sgn} \sigma$
16	$g_\lambda(x) = 2^{-\frac{1}{2}\lambda} \frac{\lvert x \rvert^\lambda \operatorname{sgn} x}{\Gamma\left(\frac{\lambda+2}{2}\right)}$	$\sqrt{2\pi}\, i g_{-\lambda-1}(\sigma) = \sqrt{2\pi}\, i\, \frac{2^{\frac{1}{2}(\lambda+1)} \lvert \sigma \rvert^{-\lambda-1} \operatorname{sgn} \sigma}{\Gamma\left(\frac{1-\lambda}{2}\right)}.$

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Entry no.	Generalized function f	Fourier transform $F[f]$
17	x^m	$2(-i)^m \pi\, \delta^{(m)}(\sigma)$
18	x^{-m}	$i^m \dfrac{\pi}{(m-1)!} \sigma^{m-1} \operatorname{sgn} \sigma$
19	x^{-1}	$i\pi \operatorname{sgn} \sigma$
20	x^{-2}	$-\pi \mid \sigma \mid$
21	$x_+^\lambda \quad (\lambda \neq -1, -2, \ldots)$	$ie^{i\lambda(\pi/2)}\, \Gamma(\lambda+1)\, (\sigma + i0)^{-\lambda-1}$ $= i\Gamma(\lambda+1)$ $\times [e^{\lambda i(\pi/2)}\, \sigma_+^{-\lambda-1} - e^{-i\lambda(\pi/2)}\, \sigma_-^{-\lambda-1}]$*
22	x_+^n	$i^{n+1} n!\, \sigma^{-n-1} + (-i)^n \pi\, \delta^{(n)}(\sigma)$
23	$\theta(x)$	$i\sigma^{-1} + \pi\delta(\sigma)$
24	$x_-^\lambda \quad (\lambda \neq -1, -2, \ldots)$	$-ie^{-i\lambda(\pi/2)}\, \Gamma(\lambda+1)\, (\sigma - i0)^{-\lambda-1}$ $= i\Gamma(\lambda+1)$ $\times [e^{i\lambda(\pi/2)}\, \sigma_-^{-\lambda-1} - e^{-i\lambda(\pi/2)}\, \sigma_+^{-\lambda-1}]$*
25	$(x + i0)^\lambda$	$\dfrac{2\pi e^{i\lambda(\pi/2)}}{\Gamma(-\lambda)} \sigma_-^{-\lambda-1}$
26	$(x - i0)^\lambda$	$\dfrac{2\pi e^{-i\lambda(\pi/2)}}{\Gamma(-\lambda)} \sigma_+^{-\lambda-1}$

In Entries 27–38 we write:

$$ie^{i\lambda(\pi/2)}\, \Gamma(\lambda+1) = \frac{a_{-1}^{(n)}}{\lambda+n} + a_0^{(n)} + a_1^{(n)}(\lambda+n) + \ldots,$$

$$-ie^{-i\lambda(\pi/2)}\, \Gamma(\lambda+1) = \frac{b_{-1}^{(n)}}{\lambda+n} + b_0^{(n)} + b_1^{(n)}(\lambda+n) + \ldots,$$

$$-2 \sin\frac{\lambda\pi}{2}\, \Gamma(\lambda+1) = \frac{c_{-1}^{(n)}}{\lambda+n} + c_0^{(n)} + c_1^{(n)}(\lambda+n) + \ldots,$$

$$2 \cos\frac{\lambda\pi}{2}\, \Gamma(\lambda+1) = \frac{d_{-1}^{(n)}}{\lambda+n} + d_0^{(n)} + d_1^{(n)}(\lambda+n).$$

* Second expression for $\lambda \neq 0, \pm 1, \pm 2, \pm 3, \ldots$.

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Entry no.	Generalized function f	Fourier transform $F[f]$

The $a_{-1}^{(n)}, a_0^{(n)}, \ldots$ are given by:

$$a_{-1}^{(n)} = \frac{i^{n-1}}{(n-1)!};$$

$$a_0^{(n)} = \frac{i^{n-1}}{(n-1)!}\left[1 + \frac{1}{2} + \ldots + \frac{1}{n-1} + \Gamma'(1) + i\frac{\pi}{2}\right];$$

$$a_1^{(n)} = \frac{i^{n-1}}{(n-1)!}\left\{\sum_{j,k=1}^{n-1}\frac{1}{jk} - \frac{\pi^2}{8} + \left(1 + \frac{1}{2} + \ldots + \frac{1}{n-1}\right)\Gamma'(1) + \Gamma''(1) + i\frac{\pi}{2}\left[1 + \frac{1}{2} + \ldots + \frac{1}{n-1} + \Gamma'(1)\right]\right\};$$

$$b_i^{(n)} = \bar{a}_i^{(n)}; \qquad c_i^{(n)} = 2\,\mathrm{Re}\, a_i^{(n)}; \qquad d_i^{(n)} = 2\,Im\, a_i^{(n)}.$$

In particular,

$$b_{-1}^{(n)} = \frac{(-i)^{n-1}}{(n-1)!}; \qquad c_{-1}^{(n)} = \frac{2(-1)^{n-1}}{(n-1)!}\cos(n-1)\frac{\pi}{2};$$

$$d_{-1}^{(n)} = \frac{2(-1)^n}{(n-1)!}\sin(n-1)\frac{\pi}{2}.$$

27	$\lvert x \rvert^{-2m-1}$	$c_0^{(2m+1)}\sigma^{2m} - c_{-1}^{(2m+1)}\sigma^{2m}\ln\lvert\sigma\rvert$
28	$x^{-2m}\,\mathrm{sgn}\,x$	$id_0^{(2m)}\sigma^{2m-1} - id_{-1}^{(2m)}\sigma^{2m-1}\ln\lvert\sigma\rvert$
29	$x_+^\lambda \ln x_+$ $(\lambda \neq -1, -2, \ldots)$	$ie^{i\lambda(\pi/2)}\left\{\left[\Gamma'(\lambda+1) + i\frac{\pi}{2}\Gamma(\lambda+1)\right] \times (\sigma + i0)^{-\lambda-1} - \Gamma(\lambda+1)(\sigma+i0)^{-\lambda-1}\ln(\sigma+i0)\right\}$
30	$x_-^\lambda \ln x_-$ $(\lambda \neq -1, -2, \ldots)$	$-ie^{-i\lambda(\pi/2)}\left\{\left[\Gamma'(\lambda+1) - i\frac{\pi}{2}\Gamma(\lambda+1)\right] \times (\sigma - i0)^{-\lambda-1} - \Gamma(\lambda+1)(\sigma-i0)^{-\lambda-1}\ln(\sigma-i0)\right\}$

Continued

Entry no.	Generalized function f	Fourier transform $F[f]$
31	$\ln x_+$	$i\left\{\left(\Gamma'(1) + i\frac{\pi}{2}\right)(\sigma + i0)^{-1} - (\sigma + i0)^{-1}\ln(\sigma + i0)\right\}$
32	$\ln x_-$	$-i\left\{\left(\Gamma'(1) - i\frac{\pi}{2}\right)(\sigma - i0)^{-1} - (\sigma - i0)^{-1}\ln(\sigma - i0)\right\}$
33	$\lvert x\rvert^\lambda \ln\lvert x\rvert$ $(\lambda \neq -1, -2, \ldots)$	$ie^{i\lambda(\pi/2)}\left\{\left[\Gamma'(\lambda+1) + i\frac{\pi}{2}\Gamma(\lambda+1)\right] \times (\sigma + i0)^{-\lambda-1} - \Gamma(\lambda+1)(\sigma + i0)^{-\lambda-1}\ln(\sigma + i0)\right\}$ $-ie^{-i\lambda(\pi/2)}\left\{\left[\Gamma'(\lambda+1) - i\frac{\pi}{2}\Gamma(\lambda+1)\right] \times (\sigma - i0)^{-\lambda-1} - \Gamma(\lambda+1)(\sigma - i0)^{-\lambda-1}\ln(\sigma - i0)\right\}$
34	$\lvert x\rvert^\lambda \ln\lvert x\rvert \operatorname{sgn} x$ $(\lambda \neq -1, -2, \ldots)$	$ie^{i\lambda(\pi/2)}\left\{\left[\Gamma'(\lambda+1) + i\frac{\pi}{2}\Gamma(\lambda+1)\right] \times (\sigma + i0)^{-\lambda-1} - \Gamma(\lambda+1)(\sigma + i0)^{-\lambda-1}\ln(\sigma + i0)\right\}$ $+ ie^{-i\lambda(\pi/2)}\left\{\left[\Gamma'(\lambda+1) - i\frac{\pi}{2}\Gamma(\lambda+1)\right] \times (\sigma - i0)^{-\lambda-1} - \Gamma(\lambda+1)(\sigma - i0)^{-\lambda-1}\ln(\sigma - i0)\right\}$
35	$x^{-2m}\ln\lvert x\rvert$	$c_1^{(2m)}\lvert\sigma\rvert^{2m-1} - c_0^{(2m)}\lvert\sigma\rvert^{2m-1}\ln\lvert\sigma\rvert$
36	$x^{-2m-1}\ln\lvert x\rvert$	$id_1^{(2m+1)}\sigma^{2m}\operatorname{sgn}\sigma - id_0^{(2m+1)}\sigma^{2m}\ln\lvert\sigma\rvert\operatorname{sgn}\sigma$
37	$\lvert x\rvert^{-2m-1}\ln\lvert x\rvert$	$c_1^{(2m+1)}\sigma^{2m} - c_0^{(2m+1)}\sigma^{2m}\ln\lvert\sigma\rvert + \frac{1}{2}c_{-1}^{(2m+1)}\sigma^{2m}\ln^2\lvert\sigma\rvert$

Continued

Entry no.	Generalized function f	Fourier transform $F[f]$
38	$\lvert x\rvert^{-2m}\ln\lvert x\rvert \operatorname{sgn} x$	$id_1^{(2m)}\sigma^{2m-1} - id_0^{(2m)}\sigma^{2m-1}\ln\lvert\sigma\rvert + \frac{i}{2}d_{-1}^{(2m)}\,\sigma^{2m-1}\ln^2\lvert\sigma\rvert$
39	$(1-x^2)_+^\lambda$ $(\lambda \neq -1, -2, \ldots)$	$\sqrt{\pi}\Gamma(\lambda+1)\left(\frac{\sigma}{2}\right)^{-\lambda-\frac{1}{2}} J_{\lambda+\frac{1}{2}}(\sigma)$
40	$(1+x^2)_+^\lambda$	$\frac{2\sqrt{\pi}}{\Gamma(-\lambda)}\left\lvert\frac{\sigma}{2}\right\rvert^{-\lambda-\frac{1}{2}} K_{-\lambda-\frac{1}{2}}(\lvert\sigma\rvert)$
41	$(x^2-1)_+^\lambda$ $(\lambda \neq -1, -2, \ldots)$	$-\Gamma(\lambda+1)\sqrt{\pi}\left\lvert\frac{\sigma}{2}\right\rvert^{-\lambda-\frac{1}{2}} N_{-\lambda-\frac{1}{2}}(\lvert\sigma\rvert)$ $= \Gamma(\lambda+1)\sqrt{\pi}\left\lvert\frac{\sigma}{2}\right\rvert^{-\lambda-\frac{1}{2}} \times \frac{\cos\pi(\lambda+\frac{1}{2})\,J_{-\lambda-\frac{1}{2}}(\lvert\sigma\rvert) - J_{\lambda+\frac{1}{2}}(\lvert\sigma\rvert)}{\sin\pi(\lambda+\frac{1}{2})}$
42	$(x^2-1)_+^n$	$(-1)^n\,2\pi\left(1+\frac{d^2}{d\sigma^2}\right)^n\delta(\sigma) + (-1)^{n+1}\sqrt{\pi}\left(\frac{\sigma}{2}\right)^{-n-\frac{1}{2}} J_{n+\frac{1}{2}}(\sigma)$

2. Functions of Several Variables

Entry no.	Generalized function f	Fourier transform $F[f]$
1	$\delta(x_1, \ldots, x_n)$	1
2	1	$(2\pi)^n\delta(\sigma_1, \ldots, \sigma_n)$
3	Polynomial $P(x_1, \ldots, x_n)$	$(2\pi)^n P\left(-i\frac{\partial}{\partial\sigma_1}, \ldots, -i\frac{\partial}{\partial\sigma_n}\right)\delta(\sigma)$
4	$r^\lambda \quad \left(r = \sqrt{\sum x_j^2}\right)$	$2^{\lambda+n}\pi^{\frac{1}{2}n}\frac{\Gamma\left(\frac{\lambda+n}{2}\right)}{\Gamma\left(-\frac{\lambda}{2}\right)}\rho^{-\lambda-n} \quad \left(\rho = \sqrt{\sum \sigma_j^2}\right)$
5	$f_\lambda(r) = \frac{2^{-\frac{1}{2}\lambda} r^\lambda}{\Gamma\left(\frac{\lambda+n}{2}\right)}$	$(2\pi)^{\frac{1}{2}n} f_{-\lambda-n}(\rho) = (2\pi)^{\frac{1}{2}n}\frac{2^{\frac{1}{2}(\lambda+n)} r^{-\lambda-n}}{\Gamma\left(-\frac{\lambda}{2}\right)}$

Continued

Entry no.	Generalized function f	Fourier transform $F[f]$

In Entries 6–9 we write:

$$C_\lambda = 2^{\lambda+n}\pi^{\frac{1}{2}n}\frac{\Gamma\left(\dfrac{\lambda+n}{2}\right)}{\Gamma\left(-\dfrac{\lambda}{2}\right)}$$

$$= \frac{c_{-1}^{(n+2m)}}{\lambda+n+2m} + c_0^{(n+2m)} + c_1^{(n+2m)}(\lambda+n+2m) + \ldots;$$

the right-hand side is the Laurent expansion of this function about $\lambda = -n-2m$. Further,

$$\Omega_n = \frac{2\pi^{\frac{1}{2}n}}{\Gamma\left(\dfrac{n}{2}\right)}$$

is the hypersurface area of the unit sphere in n dimensions.

6	$r^\lambda \ln r$ $(\lambda \neq -n, -n-2, \ldots)$	$\dfrac{dC_\lambda}{d\lambda}\rho^{-\lambda-n} + C_\lambda \rho^{-\lambda-n}\ln\rho$
7	$r^\lambda \ln^2 r$ $(\lambda \neq -n, -n-2, \ldots)$	$\dfrac{d^2C_\lambda}{d\lambda^2}\rho^{-\lambda-n} + 2\dfrac{dC_\lambda}{d\lambda}\rho^{-\lambda-n} \times \ln\rho + C_\lambda\rho^{-\lambda-n}\ln^2\rho$
8	$\Omega_n r^{-2m-n}$	$c_{-1}^{(n+2m)}\rho^{2m}\ln\rho + c_0^{(n+2m)}\rho^{2m}$
9	$\Omega_n r^{-2m-n}\ln r$	$\frac{1}{2}c_{-1}^{(n+2m)}\rho^{2m}\ln^2\rho + c_0^{(n+2m)}\rho^{2m}\ln\rho + c_1^{(n+2m)}\rho^{2m}$
10	$\delta(r-a)\qquad(n \geqslant 1)$	$2^{\frac{1}{2}n-1}\Gamma(\frac{1}{2}n-\frac{1}{2})\Gamma(\frac{1}{2})\Omega_{n-1}a^{\frac{1}{2}n}\rho^{1-\frac{1}{2}n} \times J_{\frac{1}{2}(n-2)}(a\rho)$
11	The same, for $n = 3$	$4\pi a\dfrac{\sin a\rho}{\rho}$
12	$\left(\dfrac{d}{a\,da}\right)^m\dfrac{\delta(r-a)}{a}$	$2^{\frac{1}{2}n-1}\Gamma(\frac{1}{2}n-\frac{1}{2})\Gamma(\frac{1}{2})\Omega_{n-1}\sqrt{\dfrac{2}{\pi}}\dfrac{\sin a\rho}{\rho}$

For the notation in Entries 13–25 see the Summary of Fundamental Definitions and Equations for Chapter III, Section 2.

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Entry no.	Generalized function f	Fourier transform $F[f]$
13	$(P+i0)^{\lambda}$	$\dfrac{1}{\Gamma(-\lambda)}\, e^{-(\pi/2)qi}\, 2^{n+2\lambda}\,\pi^{\frac{1}{2}n}\,\Gamma(\lambda+\tfrac{1}{2}n)\,(Q-i0)^{-\lambda-\frac{1}{2}n}$
14	$(P-i0)^{\lambda}$	$\dfrac{e^{(\pi/2)qi}\, 2^{n+2\lambda}\,\pi^{\frac{1}{2}n}\,\Gamma(\lambda+\frac{1}{2}n)}{\Gamma(-\lambda)}(Q+i0)^{-\lambda-\frac{1}{2}n}$
15	P_{+}^{λ}	$2^{n+2\lambda}\,\pi^{\frac{1}{2}n-1}\,\Gamma(\lambda+1)\,\Gamma(\lambda+\tfrac{1}{2}n)$ $\times\dfrac{1}{2i}\,[e^{-i(\frac{1}{2}q+\lambda)\pi}(Q-i0)^{-\lambda-\frac{1}{2}n}-e^{i(\frac{1}{2}q+\lambda)\pi}(Q+i0)^{-\lambda-\frac{1}{2}n}]$
16	P_{-}^{λ}	$-2^{n+2\lambda}\,\pi^{\frac{1}{2}n-1}\,\Gamma(\lambda+1)\,\Gamma(\lambda+\tfrac{1}{2}n)$ $\times\dfrac{1}{2i}\,[e^{-(\pi/2)qi}(Q-i0)^{-\lambda-\frac{1}{2}n}-e^{(\pi/2)qi}(Q+i0)^{-\lambda-\frac{1}{2}n}]$
17	$(c^2+P+i0)^{\lambda}$	$\dfrac{2^{\lambda+1}(\sqrt{2\pi})^{n}\,c^{\frac{1}{2}n+\lambda}}{\Gamma(-\lambda)\sqrt{\Delta}}\;\dfrac{K_{\frac{1}{2}n+\lambda}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\frac{1}{2}n+\lambda)}}$ $=\dfrac{2^{\lambda+\frac{1}{2}n+1}\,\pi^{\frac{1}{2}n}\,e^{-\frac{1}{2}q\pi i}\,c^{\lambda+\frac{1}{2}n}}{\Gamma(-\lambda)\sqrt{\lvert\Delta\rvert}}$ $\times\left[\dfrac{K_{\lambda+\frac{1}{2}n}(cQ_{+}^{\frac{1}{2}})}{Q_{+}^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}+\dfrac{\pi i}{2}\,\dfrac{H^{(1)}_{-\lambda-\frac{1}{2}n}(cQ_{-}^{\frac{1}{2}})}{Q_{-}^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}\right].$
18	$(c^2+P-i0)^{\lambda}$	$\dfrac{2^{\lambda+1}(\sqrt{2\pi})^{n}\,c^{\frac{1}{2}n+\lambda}}{\Gamma(-\lambda)\sqrt{\Delta}}\;\dfrac{K_{\frac{1}{2}n+\lambda}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\frac{1}{2}n+\lambda)}}$ $=\dfrac{2^{\lambda+\frac{1}{2}n+1}\,\pi^{\frac{1}{2}n}\,e^{\frac{1}{2}q\pi i}\,c^{\lambda+\frac{1}{2}n}}{\Gamma(-\lambda)\sqrt{\lvert\Delta\rvert}}$ $\times\left[\dfrac{K_{\lambda+\frac{1}{2}n}(cQ_{+}^{\frac{1}{2}})}{Q_{+}^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}-\dfrac{\pi i}{2}\,\dfrac{H^{(2)}_{-\lambda-\frac{1}{2}n}(cQ_{-}^{\frac{1}{2}})}{Q_{-}^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}\right].$

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Entry no.	Generalized function f	Fourier transform $F[f]$
19	$\dfrac{(c^2+P)_+^\lambda}{\Gamma(\lambda+1)}$	$-\dfrac{2^{\lambda+\frac{1}{2}n} i\pi^{\frac{1}{2}n-1} c^{\frac{1}{2}n+\lambda}}{\sqrt{\lvert\Delta\rvert}} \times \left\{e^{-i(\lambda+\frac{1}{2}q)\pi} \dfrac{K_{\frac{1}{2}n+\lambda}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\lambda+\frac{1}{2}n)}} - e^{i(\lambda+\frac{1}{2}q)\pi} \dfrac{K_{\frac{1}{2}n+\lambda}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}\right\} = \dfrac{2^{\lambda+\frac{1}{2}n+1}\pi^{\frac{1}{2}n-1}c^{\frac{1}{2}n+\lambda}}{\sqrt{\lvert\Delta\rvert}} \times \left\{-\sin(\lambda+\tfrac{1}{2}q)\pi \dfrac{K_{\lambda+\frac{1}{2}n}(cQ_+^{\frac{1}{2}})}{Q_+^{\frac{1}{2}(\lambda+\frac{1}{2}n)}} + \dfrac{\pi}{2\sin(\lambda+\frac{1}{2}n)\pi} \times \left[\sin(\lambda+\tfrac{1}{2}q)\pi \dfrac{J_{\lambda+\frac{1}{2}n}(cQ_-^{\frac{1}{2}})}{Q_-^{\frac{1}{2}(\lambda+\frac{1}{2}n)}} + \sin\dfrac{p\pi}{2} \dfrac{J_{-\lambda-\frac{1}{2}n}(cQ_-^{\frac{1}{2}})}{Q_-^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}\right]\right\}.$
20	$\dfrac{(c^2+P)_-^\lambda}{\Gamma(\lambda+1)}$	$\dfrac{2^{\lambda+\frac{1}{2}n} i\pi^{\frac{1}{2}n-1} c^{\frac{1}{2}n+\lambda}}{\sqrt{\lvert\Delta\rvert}} \left\{e^{-\frac{1}{2}q\pi i} \dfrac{K_{\frac{1}{2}n+\lambda}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\lambda+\frac{1}{2}n)}} - e^{\frac{1}{2}q\pi i} \dfrac{K_{\frac{1}{2}n+\lambda}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}\right\} = \dfrac{2^{\lambda+\frac{1}{2}n+1}\pi^{\frac{1}{2}n-1}c^{\frac{1}{2}n+\lambda}}{\sqrt{\lvert\Delta\rvert}} \times \left\{\sin\dfrac{q\pi}{2} \dfrac{K_{\lambda+\frac{1}{2}n}(cQ_+^{\frac{1}{2}})}{Q_+^{\frac{1}{2}(\lambda+\frac{1}{2}n)}} - \dfrac{\pi}{2\sin(\lambda+\frac{1}{2}n)\pi} \times \left[\sin\dfrac{q\pi}{2} \dfrac{J_{\lambda+\frac{1}{2}n}(cQ_-^{\frac{1}{2}})}{Q_-^{\frac{1}{2}(\lambda+\frac{1}{2}n)}} + \sin\left(\lambda+\dfrac{p}{2}\right)\pi \dfrac{J_{-\lambda-\frac{1}{2}n}(cQ_-^{\frac{1}{2}})}{Q_-^{\frac{1}{2}(\lambda+\frac{1}{2}n)}}\right]\right\}.$
21	$\delta^{(t-1)} \times (c^2+P)$	$(-1)^{t+1} \dfrac{i}{\sqrt{\lvert\Delta\rvert}} 2^{\frac{1}{2}n-t}\pi^{\frac{1}{2}n-1}c^{\frac{1}{2}n-t} \times \left[e^{-\frac{1}{2}\pi i q} \dfrac{K_{\frac{1}{2}n-t}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\frac{1}{2}n-t)}} - e^{\frac{1}{2}\pi i q} \dfrac{K_{\frac{1}{2}n-t}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\frac{1}{2}n-t)}}\right].$

Continued

Entry no.	Generalized function f	Fourier transform $F[f]$
22	$\delta(c^2 + P)$	$-\dfrac{i}{\sqrt{\vert\Delta\vert}}(2\pi c)^{\frac{1}{2}n-1}\left[-e^{-\frac{1}{2}\pi q i}\dfrac{K_{\frac{1}{2}n-1}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\frac{1}{2}n-1)}} + e^{\frac{1}{2}\pi q i}\dfrac{K_{\frac{1}{2}n-1}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\frac{1}{2}n-1)}}\right].$
23	$\dfrac{(c^2+P)_+^t}{\Gamma(t+1)}$	$(-1)^{t+1} i 2^{t+\frac{1}{2}n}\pi^{\frac{1}{2}n-1}c^{\frac{1}{2}n+t} \times \left[e^{-\frac{1}{2}q\pi i}\dfrac{K_{\frac{1}{2}n+t}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\frac{1}{2}n+t)}} - e^{\frac{1}{2}q\pi i}\dfrac{K_{\frac{1}{2}n+t}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\frac{1}{2}n+t)}}\right] + (2\pi)^n\sum_{m=0}^{t}\dfrac{(-1)^m(\frac{1}{2}c)^{2t-2m}}{4^m m!(t-m)!}L^m\delta(s),$
24	$\dfrac{(c^2+P)_-^t}{\Gamma(t+1)}$	$\dfrac{i\cdot 2^{t+\frac{1}{2}n}\pi^{\frac{1}{2}n-1}c^{\frac{1}{2}n+t}}{\sqrt{\vert\Delta\vert}}\left[e^{-\frac{1}{2}q\pi i}\dfrac{K_{\frac{1}{2}n+t}[c(Q-i0)^{\frac{1}{2}}]}{(Q-i0)^{\frac{1}{2}(\frac{1}{2}n+t)}} - e^{\frac{1}{2}q\pi i}\dfrac{K_{\frac{1}{2}n+t}[c(Q+i0)^{\frac{1}{2}}]}{(Q+i0)^{\frac{1}{2}(\frac{1}{2}n+t)}}\right],$
25	$\dfrac{(c^2+P)^t}{\Gamma(t+1)}$	$(2\pi)^n\sum_{m=0}^{t}\dfrac{(-1)^m(\frac{1}{2}c)^{2t-2m}}{4^m m!(t-m)!}L^m\delta(s).$