! For an efficient use of these tables, first read `HowTo.pdf`.

T3.26D. Integrands involving exponentials and arbitrary powers of $(a + b\,x)$ on the interval $(-\infty, \infty)$.

1. $$\int_{-\infty}^{\infty} (\beta + ix)^{-\nu} e^{-ipx}\, dx = \begin{cases} 0 & \text{for } p > 0, \\ \dfrac{2\pi(-p)^{\nu-1} e^{\beta p}}{\Gamma(\nu)} & \text{for } p < 0; \Re\{\nu\} > 0,\ \Re\{\beta\} > 0. \end{cases}$$

2. $$\int_{-\infty}^{\infty} (\beta - ix)^{-\nu}\, e^{-ipx}\, dx = \begin{cases} \dfrac{2\pi p^{\nu-1} e^{-\beta p}}{\Gamma(\nu)}, & \text{for } p > 0, \\ 0 & \text{for } p < 0;\ \Re\{\nu\} > 0,\ \Re\{\beta\} > 0. \end{cases}$$

3. $$\int_{-\infty}^{\infty} (\beta - ix)^{-\mu} (\gamma - ix)^{-\nu} e^{-ipx}\, dx = \begin{cases} \dfrac{2\pi e^{-\beta p} p^{\mu+\nu-1}}{\Gamma(\mu+\nu)}\, {}_1F_1(\nu;\, \mu+\nu;\, (\beta-\gamma)p), & \text{for } p > 0, \\ 0, & \text{for } p < 0; \end{cases}$$
$$\Re\{\beta\} > 0,\ \Re\{\gamma\} > 0,\ \Re\{\mu+\nu\} > 1.$$

4. $$\int_{-\infty}^{\infty} (\beta + ix)^{-\mu} (\gamma + ix)^{-\nu} e^{-ipx}\, dx = \begin{cases} 0, & \text{for } p > 0, \\ \dfrac{2\pi e^{\gamma p} (-p)^{\mu+\nu-1}}{\Gamma(\mu+\nu)}\, {}_1F_1[\mu;\, \mu+\nu;\, (\beta-\gamma)p], & \text{for } p < 0; \end{cases}$$
$$\Re\{\beta\} > 0,\ \Re\{\gamma\} > 0,\ \Re\{\{\mu+\nu\} > 1.$$

5. $$\int_{-\infty}^{\infty} (\beta + ix)^{-2\mu} (\gamma - ix)^{-2\nu} e^{-ipx}\, dx$$
$$= \begin{cases} 2\pi(\beta+\gamma)^{-\mu-\nu} \dfrac{p^{\mu+\nu-1}}{\Gamma(2\nu)} \exp\left(\dfrac{\beta-\gamma}{2} p\right) W_{\nu-\mu,\, 1/2-\nu-\mu}(\beta p + \gamma p), & \text{for } p > 0, \\ 2\pi(\beta+\gamma)^{-\mu-\nu} \dfrac{(-p)^{\mu+\nu-1}}{\Gamma(2\mu)} \exp\left(\dfrac{\beta-\gamma}{2} p\right) W_{\mu-\nu,\, 1/2-\nu-\mu}(-\beta p - \gamma p), & \text{for } p < 0; \end{cases}$$
$$\Re\{\beta\} > 0,\ \Re\{\gamma\} > 0,\ \Re\{\{\mu+\nu\} > \tfrac{1}{2}.$$

6. $$\int_{-\infty}^{\infty} \frac{(ix)^{\nu_0} \prod_{k=1}^{n} (\beta_k + ix)^{\nu_k} e^{-ipx}\, dx}{\beta_0 - ix} = 2\pi\, e^{-\beta_0 p}\, \beta_0^{\nu_0} \prod_{k=1}^{n} (\beta_0 + \beta_k)^{\nu_k},$$

$$\Re\{\nu_0\} > -1,\ \Re\{\beta_k\} > 0,\ \sum_{k=0}^{n} \Re\{\nu_k\} < 1,\ \arg\{i\,x\} = \frac{\pi}{2}\operatorname{sgn} x,\ p > 0.$$

7. $$\int_{-\infty}^{\infty} \frac{(ix)^{\nu_0} \prod_{k=1}^{n} (\beta_k + ix)^{\nu_k} e^{-ipx}\, dx}{\beta_0 + ix} = 0,$$

$$\Re\{\nu_0\} > -1,\ \Re\{\beta_k\} > 0,\ \sum_{k=0}^{n} \Re\{\nu_k\} < 1,\ \arg\{i\,x\} = \frac{\pi}{2}\operatorname{sgn} x,\ p > 0.$$

8. $$\int_{-\infty}^{\infty} \frac{(,x)^{-\nu} e^{-i\,px}\, dx}{\beta^2 + x^2} = \pi \beta^{-\nu-1} e^{-|p|\beta}, \quad |\nu| < 1,\ \Re\{\beta\} > 0,\ \arg\{i\,x\} = \frac{\pi}{2}\operatorname{sgn} x.$$

9. $$\int_{-\infty}^{\infty} \frac{(\beta + ix)^{-\nu} e^{-ipx}}{\gamma^2 + x^2}\, dx = \frac{\pi}{\gamma}(\beta + \gamma)^{-\nu} e^{-p\gamma}, \quad \Re\{\nu > -1,\ p > 0,\ \Re\{\beta\} > 0,\ \Re\{\gamma\} > 0.$$

10. $$\int_{-\infty}^{\infty} \frac{(\beta - ix)^{-\nu} e^{-ipx}}{\gamma^2 + x^2}\, dx = \frac{\pi}{\gamma}(\beta + \gamma)^{-\nu} e^{\gamma p}, \quad p < 0,\ \Re\{\beta\} > 0,\ \Re\{\gamma\} > 0,\ \Re\{\nu\} > -1.$$