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

T2.50A. Integrands involving product and division of trigonometric functions by powers of $(a+b\,x)$ on the interval $(0,1)$.

1. $$\int_0^1 x^{\mu-1}\,\sin(ax)\,dx = \frac{-i}{2\mu}[\,{}_1F_1(\mu;\,\mu+1;\,ia) - {}_1F_1(\mu;\,\mu+1;\,-ia)],$$
$$a>0,\ \Re\{\mu\}>-1,\ \mu\neq 0.$$

2. $$\int_0^1 x^{\mu-1}\,\cos(ax)\,dx = \frac{1}{2\mu}[\,{}_1F_1(\mu;\,\mu+1;\,ia) + {}_1F_1(\mu,\,\mu+1;\,-i\,a)],\quad a>0,\ \Re\{\mu\}>0.$$

3. $$\int_0^1 (1-x)^{\nu}\,\sin(ax)\,dx = \frac{1}{a} - \frac{\Gamma(\nu+1)}{a^{\nu+1}}C_\nu(a) = a^{-\nu-1/2}s_{\nu+1/2,\,1/2}(a),\quad a>0,\ \Re\{\nu\}>-1.$$

4. $$\int_0^1 (1-x)^{\mu}\cos(ax)\,dx$$
$$= \begin{cases} \dfrac{i}{2}a^{-\nu-1}\left\{\exp\left[\dfrac{i}{2}(\nu\pi-2a)\right]\gamma\,(\nu+1,\,-i\,a) - \exp\left[-\dfrac{i}{2}(\nu\pi-2a)\right]\gamma\,(\nu+1,\,i\,a)\right\}, \\ \quad\text{or} \\ \Gamma(\nu+1)\displaystyle\sum_{n=0}^{\infty}(-a^2)^n/\Gamma(\nu+2+2n),\quad a>0,\ \Re\{\nu\}>-1. \end{cases}$$

5. $$\int_0^1 x^{\nu-1}(1-x)^{\mu-1}\,\sin(ax)\,dx = -\frac{i}{2}\,\mathrm{B}(\mu,\,\nu)\left[\,{}_1F_1(\nu;\,\nu+\mu;\,i\,a) - {}_1F_1(\nu;\,\nu+\mu;\,-i\,a)\right],$$
$$\Re\{\mu\}>0,\ \Re\{\nu\}>-1,\ \nu\neq 0.$$

6. $$\int_0^1 x^{\nu-1}(1-x)^{\mu-1}\,\cos(ax)\,dx = \frac{1}{2}\,\mathrm{B}(\mu,\,\nu)\left[\,{}_1F_1(\nu;\,\nu+\mu;\,ia) + {}_1F_1(\nu;\,\nu+\mu;\,-ia)\right],$$
$$\Re\{\mu\}>0,\ \Re\{\nu\}>0.$$

7. $$\int_0^1 x^{\mu}(1-x)^{\mu}\,\sin(2ax)\,dx = \frac{\sqrt{\pi}}{(2a)^{\mu+1/2}}\Gamma(\mu+1)\,J_{\mu+1/2}(a)\,\sin a,\quad a>0,\ \Re\{\mu\}>-1.$$

8. $$\int_0^1 x^{\mu}(1-x)^{\mu} \cos(2ax)\,dx = \frac{\sqrt{\pi}}{(2a)^{\mu+1/2}}\Gamma(\mu+1)\,J_{\mu+1/2}(a)\,\cos a, \quad a>0,\ \Re\{\mu\}>-1.$$