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

T2.55A. Integrands involving product of trigonometric functions of linear and quadratic arguments and sum of powers and square roots of $(a + b\,x^n)$ on the interval $(0, 1)$.

1. $$\int_0^1 \frac{\cos ax - \cos(a/x)}{1-x^2}\,dx = \frac{1}{2}\int_0^\infty \frac{\cos ax - \cos(a/x)}{1-x^2}\,dx = \frac{\pi}{2}\,\sin a, \quad a > 0.$$

2. $$\int_0^1 \frac{\cos ax + \cos(a/x)}{1+x^2}\,dx = \frac{1}{2}\int_0^\infty \frac{\cos ax + \cos(a/x)}{1+x^2}\,dx = \frac{\pi}{2}\,e^{-a}, \quad a > 0.$$

3. $$\int_0^1 \sin\left[a\left(x+\frac{1}{x}\right)\right]\,\sin\left[a\left(x-\frac{1}{x}\right)\right]\frac{dx}{1-x^2}$$
$$= \frac{1}{2}\int_0^\infty \sin\left[a\left(x+\frac{1}{x}\right)\right]\,\sin\left[a\left(x-\frac{1}{x}\right)\right]\frac{dx}{1-x^2} = -\frac{\pi}{4}\,\sin 2a, \quad a \geq 0.$$

4. $$\int_0^1 \cos\left[a\left(x+\frac{1}{x}\right)\right]\,\cos\left[a\left(x-\frac{1}{x}\right)\right]\frac{dx}{1+x^2}$$
$$= \frac{1}{2}\int_0^\infty \cos\left[a\left(x+\frac{1}{x}\right)\right]\,\cos\left[a\left(x-\frac{1}{x}\right)\right]\frac{dx}{1+x^2} = \frac{\pi}{4}e^{-2a}, \quad a \geq 0.$$

5. $$\int_0^1 \cos(a\,\ln x)\frac{dx}{(1+x)^2} = \frac{a\pi}{2\,\sinh a\pi}.$$

6. $$\int_0^1 x^{\mu-1}\,\sin(\beta\,\ln x)\,dx = -\frac{\beta}{\beta^2+\mu^2}, \quad \Re\{\mu\} > |\Im\{\beta\}|.$$

7. $$\int_0^1 x^{\mu-1}\,\cos(\beta\,\ln x)\,dx = \frac{\mu}{\beta^2+\mu^2}, \quad \Re\{\mu\} > |\Im\{\beta\}|.$$
