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

T2.56B. Integrands involving product of exponentials, trigonometric functions and powers of trigonometric functions on the interval $(0, \pi)$.

1. $$\int_0^\pi e^{i\beta x} \sin^{\nu-1} x\, dx = \frac{\pi\, e^{i\beta\pi/2}}{2^{\nu-1}\nu\, \mathrm{B}\left(\frac{\nu+\beta+1}{2}, \frac{\nu-\beta+1}{2}\right)}, \quad \Re\{\nu\} > -1.$$

2. $$\int_0^\pi e^{2i\beta x} \sin^{2\mu} x \cos^{2\nu} x\, dx = \frac{\pi \exp[i\pi(\beta-\nu)]\, F(-2\nu,\, \beta-\mu-\nu;\, 1+\beta+\mu-\nu;\, -1)}{4^{\mu+\nu}(2\mu+1)\, \mathrm{B}(1-\beta+\mu+\nu,\, 1+\beta+\mu-\nu)}.$$

3. $$\int_0^\pi e^{-px} \sin^{2m} x\, dx = \frac{(2m)!(1-e^{-p\pi})}{p(p^2+2^2)(p^2+4^2)\ldots[p^2+(2m)^2]}.$$

4. $$\int_0^\pi e^{-px} \sin^{2m+1} x\, dx = \frac{(2m+1)!(1+e^{-p\pi})}{(p^2+1^2)(p^2+3^2)\ldots[p^2+(2m+1)^2]}.$$

5. $$\int_0^\pi e^{a\cos x} \sin x\, dx = \frac{2}{a} \sinh a.$$

6. $$\int_0^\pi e^{i\beta\cos x} \cos nx\, dx = i^n\, \pi J_n(\beta).$$

7. $$\int_0^\pi e^{\pm\beta\cos x} \sin^{2\nu} x\, dx = \sqrt{\pi}\left(\frac{2}{\beta}\right)^\nu \Gamma\left(\nu+\frac{1}{2}\right) I_\nu(\beta), \quad \Re\{\nu\} > -\tfrac{1}{2}.$$

8. $$\int_0^\pi e^{i\beta\cos x} \sin^{2\nu} x\, dx = \sqrt{\pi}\left(\frac{2}{\beta}\right)^\nu \Gamma\left(\nu+\frac{1}{2}\right) J_\nu(\beta), \quad \Re\{\nu\} > -\tfrac{1}{2}.$$