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

T2.03C. Powers of x, binomials of the form $(a+b\,x)$ and polynomials in x on the interval $(0, y)$.

1. $\displaystyle\int_0^y (y^2 - x^2)^{n-1/2}\,dx = \frac{(2n-1)!!}{2(2n)!!}\,\pi\,y^{2n}.$

2. $$\int_0^y x^{2j}\left(y^2 - x^2\right)^k\,dx = \frac{1}{2}\,\frac{\dfrac{2j-1}{2}\,\dfrac{2j-3}{2}\cdots\dfrac{k(k-1)}{2}}{\left(k+\dfrac{2j+1}{2}\right)\left(k+\dfrac{2j-1}{2}\right)\cdots\dfrac{1}{2}}\;y^{2j+2k+1}.$$

3. $$\int_0^y x^{\lambda-1}(y-x)^{\mu-1}(x^2+\beta^2)^{\nu}\,dx$$
$$= \beta^{2\nu}y^{\lambda+\mu-1}\,\mathrm{B}(\lambda,\,\mu)\,{}_3F_2\left(-\nu,\,\frac{\lambda}{2},\,\frac{\lambda+1}{2};\,\frac{\lambda+\mu}{2},\,\frac{\lambda+\mu+1}{2};\,\frac{-y^2}{\beta^2}\right),$$
$$\Re\{y/\beta\} > 0,\ \lambda > 0,\ \Re\{\mu\} > 0.$$

4. $$\int_0^y x^{\nu-1}(y-x)^{\mu-1}(x^m+\beta^m)^{\lambda}\,dx = \beta^{m\lambda}y^{\mu+\nu+1}\mathrm{B}(\mu,\,\nu)$$
$$\times{}_{m+1}F_m\left(-\lambda,\,\frac{\nu}{m},\,\frac{\nu+1}{m},\ldots,\frac{\nu+m-1}{m};\,\frac{\mu+\nu}{m},\,\frac{\mu+\nu+1}{m},\ldots,\frac{\mu+\nu+m-1}{m};\,\frac{-y^m}{\beta^m}\right),$$
$$\Re\{\mu\} > 0,\ \Re\{\nu\} > 0,\ \left|\arg\left(\frac{y}{\beta}\right)\right| < \frac{\pi}{m}.$$

5. $$\int_0^y \frac{(y-x)^{\mu-1}\left[(\sqrt{x+2}+\sqrt{x})^{2\nu}+(\sqrt{x+2}-\sqrt{x})^{2\nu}\right]}{\sqrt{x(x+2)}}\,dx$$
$$= 2\frac{2\mu+1}{2}\sqrt{\pi[y(y+2)]^{\mu-1/2}}\,P_{\nu-1/2}^{(1/2-\mu)}(y+1), \quad |\arg y| < \pi,\ \Re\{\mu > 0\}.$$
