PROOF OF FORMULA 3.523.2

$$\int_0^\infty \frac{x^{2n-1}\,dx}{\sinh ax} = \frac{2^{2n}-1}{2n}\left(\frac{\pi}{a}\right)^{2n}|B_{2n}|$$

The value $b = 2n$ in **3.523.1**:

$$\int_0^\infty \frac{x^{b-1}\,dx}{\sinh ax} = \frac{2^b-1}{2^{b-1}a^b}\Gamma(b)\zeta(b),$$

gives

$$\int_0^\infty \frac{x^{2n-1}\,dx}{\sinh ax} = \frac{2^{2n}-1}{2^{2n-1}a^{2n}}\Gamma(2n)\zeta(2n).$$

The result now follows from the evaluation

$$\zeta(2n) = \frac{2^{2n-1}\pi^{2n}|B_{2n}|}{(2n)!}.$$