

PROOF OF FORMULA 3.523.9

$$\int_0^\infty \frac{x^6 dx}{\cosh x} = \frac{61\pi^7}{128}$$

Entry 3.523.4 states that

$$\int_0^\infty \frac{x^{2n} dx}{\cosh x} = \left(\frac{\pi}{2}\right)^{2n+1} |E_{2n}|.$$

Take $n = 3$ and use $E_6 = -61$.