PROOF OF FORMULA 3.524.2

$$\int_0^\infty x^{2m} \frac{\sinh ax}{\sinh bx}\, dx = \frac{\pi}{2b} \left(\frac{d}{da}\right)^{2m} \left(\tan \frac{\pi a}{2b}\right)$$

Entry **3.511.2** states that

$$\int_0^\infty \frac{\sinh ax}{\sinh bx}\, dx = \frac{\pi}{2b} \tan \frac{\pi a}{2b}.$$

The result now follows by differentiation.