

PROOF OF FORMULA 3.524.11

$$\int_0^{\infty} x^6 \frac{\sinh ax}{\sinh bx} dx = 16 \sin \frac{\pi a}{2b} \left(\frac{\pi}{2b} \sec \frac{\pi a}{2b} \right)^7 \left(45 - 30 \cos^2 \frac{\pi a}{2b} + 2 \cos^4 \frac{\pi a}{2b} \right)$$

Entry **3.524.2** states that

$$\int_0^{\infty} x^6 \frac{\sinh ax}{\sinh bx} dx = \frac{\pi}{2b} \left(\frac{d}{da} \right)^6 \tan \left(\frac{\pi a}{2b} \right).$$

The result follows by computing the derivative.