PROOF OF FORMULA 3.524.14

$$\int_0^\infty x^5 \frac{\sinh ax}{\cosh bx}\,dx = \sin\frac{\pi a}{2b}\left(\frac{\pi}{2b}\sec\frac{\pi a}{2b}\right)^6\left(120 - 60\cos^2\frac{\pi a}{2b} + \cos^4\frac{\pi a}{2b}\right)$$

Entry 3.524.4 states that

$$\int_0^\infty x^5 \frac{\sinh ax}{\cosh bx}\,dx = \frac{\pi}{2b}\left(\frac{d}{da}\right)^5 \sec\frac{\pi a}{2b}.$$

The result is obtained by computing the derivative.