PROOF OF FORMULA 3.524.12

$$\int_0^\infty x\,\frac{\sinh ax}{\cosh bx}\,dx = \frac{\pi^2}{4b^2}\sin\left(\frac{\pi a}{2b}\right)\sec^2\left(\frac{\pi a}{2b}\right)$$

According to entry **3.524.4**

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

The result follows by computing the derivative.