PROOF OF FORMULA 3.524.16

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

Entry **3.524.8** states that
$$\int_0^\infty x \, \frac{\cosh ax}{\sinh bx} \, dx = \frac{\pi}{2b} \frac{d}{da} \tan \frac{\pi a}{2b}.$$
The result comes from computing the derivative.