PROOF OF FORMULA 3.622.1

$$\int_0^{\pi/2} \tan^{\pm\mu} x \, dx = \frac{\pi}{2} \sec\left(\frac{\pi\mu}{2}\right)$$

The integral representation

$$B(a,b) = 2 \int_0^{\pi/2} \sin^{2a-1} x \, \cos^{2b-1} x \, dx$$

shows that

$$\int_0^{\pi/2} \tan^{\pm\mu} x \, dx = \frac{1}{2} B\left(\frac{1\pm\mu}{2}, 1 - \frac{1\pm\mu}{2}\right).$$

This can be simplified using $\Gamma(a)\Gamma(1-a) = \pi/\sin \pi a$.