PROOF OF FORMULA 3.623.2

$$\int_0^{\pi/4} \tan^\mu x \, \sin^2 x \, dx = \frac{(1+\mu)}{4}\beta\left(\frac{1+\mu}{2}\right) - \frac{1}{4}$$

Let $y = \tan x$ to obtain

$$\int_0^{\pi/4} \tan^\mu x \, \sin^2 x \, dx = \int_0^1 \frac{y^{\mu+2}\, dy}{(1+y^2)^2}.$$

The result now follows from **3.251.7**:

$$\int_0^1 \frac{x^a \, dx}{(1+x^2)^2} = \frac{(a-1)}{4}\beta\left(\frac{a-1}{2}\right) - \frac{1}{4}.$$