PROOF OF FORMULA 3.248.1

$$\int_0^\infty \frac{x^{\mu-1}\,dx}{\sqrt{1+x^\nu}} = \frac{1}{\nu} B\left(\frac{\mu}{\nu}, \frac{1}{2} - \frac{\mu}{\nu}\right)$$

The change of variables $t = x^\nu$ yields

$$\int_0^\infty \frac{x^{\mu-1}\,dx}{\sqrt{1+x^\nu}} = \frac{1}{\nu} \int_0^\infty \frac{t^{\mu/\nu-1}\,dt}{(1+t)^{1/2}}.$$

Now use the representation

$$B(x,y) = \int_0^\infty \frac{t^{x-1}\,dt}{(1+t)^{x+y}}$$

with $x = \mu/\nu$ and $y = 1/2 - \mu/\nu$ to obtain the result.