

PROOF OF FORMULA 4.263.2

$$\int_0^1 \frac{\ln^4 x \, dx}{1+x^2} = \frac{5\pi^5}{64}$$

Let $x = \tan \varphi$ to obtain

$$\int_0^1 \frac{\ln^4 x \, dx}{1+x^2} = \int_0^{\pi/4} \ln^4 \tan \varphi \, d\varphi.$$

This is evaluated in entry 4.227.8.