PROOF OF FORMULA 4.261.6

$$\int_0^1 \frac{\ln^2 x}{1+x^2}\,dx = \frac{\pi^3}{16}$$

The change of variables $x = \tan\varphi$ gives

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

This integral appears in entry **4.227.7**.