

PROOF OF FORMULA 4.251.6

$$\int_0^1 \frac{x^{2n-1} \ln x \, dx}{1+x} = \frac{\pi^2}{12} + \sum_{j=1}^{2n-1} \frac{(-1)^j}{j^2}$$

Let $t = -\ln x$ to obtain

$$\int_0^1 \frac{x^{2n-1} \ln x \, dx}{1+x} = - \int_0^\infty \frac{te^{-(2n-1)t} \, dt}{1+e^t}.$$

This integral is evaluated in 3.411.13.