

**PROOF OF FORMULA 3.435.3**

$$\int_0^{\infty} \left( \frac{1}{1+x} - e^{-x} \right) \frac{dx}{x} = \gamma$$

The integral representation for the digamma function

$$\psi(a) = \int_0^{\infty} \left( e^{-x} - \frac{1}{(1+x)^a} \right) \frac{dx}{x},$$

appears in 8.361.2. The special case  $a = 1$  and the value  $\psi(1) = -\gamma$  give the result.