

### PROOF OF FORMULA 3.351.5

$$\int_1^{\infty} \frac{e^{-\mu x}}{x} dx = -\text{Ei}(-\mu)$$

The *exponential integral* is defined by

$$\text{Ei}(x) = \int_{-\infty}^x \frac{e^t}{t} dt,$$

for  $x < 0$  and by its principal value when  $x > 0$ .

Let  $t = -\mu x$  to obtain

$$\int_1^{\infty} \frac{e^{-\mu x}}{x} dx = - \int_{-\infty}^{-\mu} \frac{e^t}{t} dt.$$

The result is  $-\text{Ei}(-\mu)$ .