PROOF OF FORMULA 3.351.5

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

The *exponential integral* is defined by

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

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 $-\mathrm{Ei}(-\mu)$.