

**PROOF OF FORMULA 3.434.1**

$$\int_0^{\infty} \frac{e^{-ax} - e^{-bx}}{x^{\rho+1}} dx = \frac{b^{\rho} - a^{\rho}}{\rho} \Gamma(1 - \rho)$$

Start with

$$\int_0^{\infty} \frac{e^{-ax} - e^{-bx}}{x^{\rho+1}} dx = \int_0^{\infty} x^{-\rho-1} e^{-ax} dx - \int_0^{\infty} x^{-\rho-1} e^{-bx} dx.$$

Let  $t = ax$  in the first integral and  $t = bx$  in the second one to obtain the result.