

**PROOF OF FORMULA 3.381.4**

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

Let  $t = ax$  to produce

$$\int_0^{\infty} x^{b-1} e^{-ax} dx = a^{-b} \int_0^{\infty} t^{b-1} e^{-t} dt.$$

Now use the integral representation of the gamma function to conclude.