

PROOF OF FORMULA 3.351.3

$$\int_0^{\infty} x^n e^{-\mu x} dx = \frac{n!}{\mu^{n+1}}$$

Let $t = \mu x$ to obtain

$$\int_0^{\infty} x^n e^{-\mu x} dx = \frac{1}{\mu^{n+1}} \int_0^{\infty} t^n e^{-t} dt.$$

The integral is $\Gamma(n + 1) = n!$, so the formula has been established.