

PROOF OF FORMULA 3.326.1

$$\int_0^{\infty} \exp(-x^a) dx = \frac{1}{a} \Gamma\left(\frac{1}{a}\right)$$

Let $t = x^a$ to obtain

$$\int_0^{\infty} \exp(-x^a) dx = \frac{1}{a} \int_0^{\infty} t^{1/a-1} e^{-t} dt.$$

The integral representation of the gamma function

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

gives the result.