

PROOF OF FORMULA 3.194.3

$$\int_0^{\infty} \frac{x^{\mu-1} dx}{(1+bx)^{\nu}} = b^{-\mu} B(\mu, \nu - \mu)$$

Let $t = bx$ to obtain

$$\int_0^{\infty} \frac{x^{\mu-1} dx}{(1+bx)^{\nu}} = \frac{1}{b^{\mu}} \int_0^{\infty} \frac{t^{\mu-1} dt}{(1+t)^{\nu}}.$$

The result follows from the integral representation

$$B(a, b) = \int_0^{\infty} \frac{t^{a-1} dt}{(1+t)^{a+b}}.$$