# PROOF OF FORMULA 3.196.2

$$\int_a^\infty (x+b)^{-\nu}(x-a)^{\mu-1}\,dx = (a+b)^{\mu-\nu}B(\nu-\mu,\mu)$$

Let $t = a/x$ to obtain

$$\int_a^\infty (x+b)^{-\nu}(x-a)^{\mu-1}\,dx = a^{\mu-\nu}\int_0^1 t^{\nu-\mu-1}(1-t)^{\mu-1}(1+bt/a)^{-\nu}\,dt.$$

The integral representation of the hypergeometric function

$${}_2F_1[\alpha,\beta;\gamma;z] = \frac{1}{B(\beta,\gamma-\beta)}\int_0^1 t^{\beta-1}(1-t)^{\gamma-\beta-1}(1-tz)^{-\alpha}\,dt,$$

shows that

$$\int_a^\infty (x+b)^{-\nu}(x-a)^{\mu-1}\,dx = a^{\mu-\nu}B(\nu-\mu,\mu)\,{}_2F_1[\nu,\nu-\mu;\nu;-b/a].$$

The result now follows from the identity

$$(1+z)^a = {}_2F_1[-a,s;s;-z].$$