PROOF OF FORMULA 3.191.2

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

Let $x = at$ to obtain

$$\int_a^\infty x^{-\nu}(x-a)^{\mu-1}\,dx = a^{\mu-\nu}\int_1^\infty t^{-\nu}(t-1)^{\mu-1}\,dt.$$

The change of variables $s = 1/(t-1)$ produces

$$a^{\mu-\nu}\int_1^\infty t^{-\nu}(t-1)^{\mu-1}\,dt = a^{\mu-\nu}\int_0^\infty \frac{s^{\nu-\mu-1}\,ds}{(1+s)^\nu}.$$

The result now follows from the integral representation

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