PROOF OF FORMULA 3.194.7

$$\int_0^\infty \frac{x^m\,dx}{(a+bx)^{n+1/2}} = 2^{m+1}m!\frac{(2n-2m-3)!!}{(2n-1)!!}\frac{a^{m-n+1/2}}{b^{m+1}}$$

Let $x = at/b$ to produce

$$\int_0^\infty \frac{x^m\,dx}{(a+bx)^{n+1/2}} = \frac{a^{m-n+1/2}}{b^{m+1}}\int_0^\infty \frac{t^m\,dt}{(1+t)^{n+1/2}}.$$

The integral representation

$$B(u,v) = \int_0^\infty \frac{t^{u-1}\,dt}{(1+t)^{u+v}},$$

shows that

$$\int_0^\infty \frac{t^m\,dt}{(1+t)^{n+1/2}} = B(m+1, n-m-1/2).$$

The result now follows from

$$\Gamma(r+\tfrac{1}{2}) = \frac{\sqrt{\pi}\,(2r-1)!!}{2^r}.$$