FORMULA 3.195

$$\int_0^\infty \frac{(1+x)^{p-1}}{(x+a)^{p+1}}\,dx = \begin{cases} (1-a^{-p})/p(a-1) & \text{if } a>0, a\neq 1, p\neq 0 \\ \ln a/(a-1) & \text{if } p=0 \\ 1 & \text{if } a=1 \end{cases}$$

The change of variables $u = \frac{1+x}{x+a}$ gives

$$\int_0^\infty \frac{(1+x)^{p-1}}{(x+a)^{p+1}}\,dx = \frac{1}{a-1}\int_{1/a}^1 u^{p-1}\,du.$$

The result is now obtained in elementary form.