

Integration example with result $\pi / \sin p\pi$

If $0 < p < 1$

$$\int_0^\infty \frac{x^{p-1}}{x+1} dx = \left| \begin{array}{ll} x = e^u & \\ dx = e^u du & \\ x = 0 & u = -\infty \\ x = \infty & u = \infty \end{array} \right| \quad (1)$$
$$= \int_{-\infty}^\infty \frac{e^{(p-1)u}}{1+e^u} e^u du = \int_{-\infty}^\infty \frac{e^{pu}}{1+e^u} du = \frac{\pi}{\sin p\pi}$$

Pawel Jan Piskorz (paweljs@gmail.com)