

# Residuum in $\infty$

## Definition

$$\text{Res}(f, \infty) := -\text{Res}(g, 0)$$

wobei

$$g(z) := \frac{1}{z^2} f\left(\frac{1}{z}\right)$$

## Begründung

$$z \Big|_{z=\infty} \rightsquigarrow \frac{1}{z} \Big|_{z=0}$$

$u = \frac{1}{z}$  ist die neue Variable

$$f(z) \rightsquigarrow f\left(\frac{1}{z}\right)$$

$$\begin{aligned} \oint_{|z|=\frac{1}{r}} f\left(\frac{1}{z}\right) d\left(\frac{1}{z}\right) &= - \oint_{|z|=\frac{1}{r}} f\left(\frac{1}{z}\right) \frac{1}{z^2} dz \\ &= -2\pi i \text{Res}(g, 0) \end{aligned}$$