$f(z) = e^{\frac{1}{z}}$

$z = 0$

$f(z) = \frac{\cos z}{z^2}$

$z = 0$

n

k

$0 \leq k \leq n$

$$f(z) = \frac{(1+z)^n}{z^{k+1}} z \neq 0$$

$z = 0$

$\int_\gamma f(z) \partial z$

γ

$z = 0$

z_0

f

$Res[f, z_0]$

$\int_\gamma f(z) \partial z$

γ

z_0

$f(z) = \frac{\sin z}{z} z \neq 0$

$f(z) = \frac{1}{z} e^z z \neq 0$

$f(z) = \frac{\sinh z}{z^6} z \neq 0$

$f(z) = \frac{1}{z-1} z \neq 1$

$f(z) = \frac{z}{(z-1)(z-3)} z \neq 1, 3$

$f(z) = \frac{1}{1+z^2}$

$z = \pm i$

$f(z) = \frac{z}{z^n - 1}$

$z_k = e^{\frac{2\pi k}{n} i}$

$k = 0, 1, \cdots, n-1$

$f(z) = \frac{e^z}{(z-1)^n}$

$z = 1$

$f(z) = \frac{1}{(1+z^2)^n}$

$f(z) = \frac{1}{z^3 - z^5}$

$f(z) = \frac{e^{z^2}}{z-1}$

$f(z) = (\frac{\cos z - 1}{z})^2$

$f(z) = \frac{e^z}{(z^2-1)^2}$

f

g

D

z_0

$$Res[f+g, z_0] = Res[f, z_0] + Res[g, z_0].$$

$Res[f^2, z_0] \neq (Res[f, z_0])^2$

z_0

n

f

$(n+1)$

g

z_0

$h = \frac{f}{g}$

$$Res[h, z_0] = (n+1)\frac{f^n(z_0)}{\ldots}$$