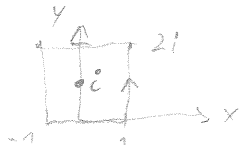


$$(47)(a) \oint_{C_a} \frac{z^2+z+1}{(z-i)^2} dz$$



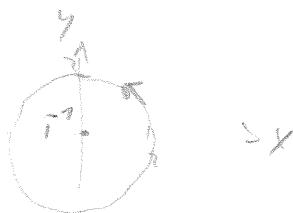
erweiterte CIF:  $f^{(n)}(z_0) = \frac{n!}{2\pi i} \oint_{\gamma} \frac{f(z)}{(z-z_0)^{n+1}} dz$

$$f(z) = z^2+z+1 \quad n=1, \quad z_0=i$$

$$f'(z) = 2z+1 \quad f'(z_0) = 2i+1$$

$$\rightarrow \oint_{C_a} \frac{z^2+z+1}{(z-i)^2} dz = \frac{2\pi i}{1} \cdot (2i+1) = \underline{2\pi i - 4\pi}$$

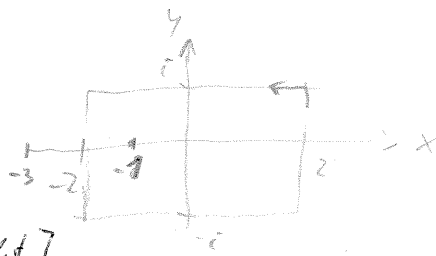
$$(b) \oint_{C_b} \frac{e^z}{(z+1)^3} dz$$



$$f''(z) = e^z$$

$$\rightarrow \oint_{C_b} \frac{e^z}{(z+1)^3} dz = \frac{2\pi i}{2} \cdot e^{-1} = \underline{\frac{i\pi}{e}}$$

$$(c) \oint_{C_c} \frac{z}{(z+1)(z+3)} dz =$$



[~~400~~  $z=-3$  nicht v.  $C_c$  umrandet]

~~holomorph~~  $\hookrightarrow \frac{z}{z+3}$  holomorph im von  $C_c$  umrandeten Gebiet

$$f(z) = \frac{z}{z+3}$$

$$\oint_{C_c} \frac{z}{z+1} dz = 2\pi i \cdot \frac{-1}{-1+3}$$

$$= \underline{-i\pi}$$