

Complex functions for Engineering Students

Exercise class 6

Exercise 1:

Compute, if possible with the help of Cauchy's integral formula, the following curve integrals (let all occurring curves be positively oriented):

$$\begin{aligned} \text{a)} \quad \oint_{|z|=1} \frac{1}{z^2+4} dz, \quad \text{b)} \quad \oint_{|z|=2} \frac{z^2+1}{z+1} dz, \quad \text{c)} \quad \oint_{|z+i|=1} \frac{\cos z}{(z+i)^2} dz, \\ \text{d)} \quad \oint_{|z-2|=1} \sin z + \frac{\ln z}{(z-2)^2} dz, \quad \text{e)} \quad \oint_{|z+i|=2} \frac{\cos z}{z^3} dz, \quad \text{f)} \quad \oint_{|z|=4} \frac{\cosh z}{(z-i\pi)^5} dz. \end{aligned}$$

Exercise 2:

Indicate **all** the power series expansions of the function

$$f(z) = \frac{5z}{z^2 + z - 6}$$

at the development point $z_0 = i$. Where do the series converge in each case?

Dates of classes: 19.6.- 23.6.