## **Complex functions for Engineering Students**

## Homework 6

## Exercise 1:

Compute directly and with the help of a primitive function

a) 
$$\int_{c} 2z - 3 dz$$
 along the segment from  $-1 - i$  to  $-i$ ,  
b)  $\int_{c} z \cosh z dz$  for  $c(t) = it$  with  $0 \le t \le 1$ ,  
c)  $\int_{-i}^{1} \frac{z+1}{z} dz$  for  $c(\varphi) = e^{i\varphi}$  (positively oriented),  
d)  $\int_{-i}^{i} \sin z dz$  for  $c(t) = it$ ,  $-1 \le t \le 1$ .

## Exercise 2:

- a) Compute the Taylor series of  $f(z) = \int_0^z \frac{d\xi}{4+\xi^2}$  at development point  $z_0 = 0$  and determine the convergence radius.
- b) Determine the convergence radii of the following Taylor series functions at the given development points  $z_0$  and without computing the series itself:

(i) 
$$f(z) = \frac{3}{z^2 + 2z + 5}$$
,  $z_0 = i$  and  $z_0 = 0$ ,  
(ii)  $f(z) = \frac{2}{e^z - 1}$ ,  $z_0 = 2\pi(1 + i)$ ,  
(iii)  $f(z) = \frac{z}{\ln(3 - 2z)}$ ,  $z_0 = 0$  and  $z_0 = \frac{11}{8}$ .

Hand in until: 23.6.