Fachbereich Mathematik der Universität Hamburg **SoSe 2023**
Prof. Dr. J. Struckmeier
Dr. K. Rothe, E. Ficola

Complex functions for Engineering Students

Homework 3

Exercise 1:

The cos function in the complex field is defined by

$$\cos z = \frac{1}{2}\left(e^{iz} + e^{-iz}\right) .$$

Compute real and imaginary part of $\cos z$ and determine all solutions of $\cos z = 3$.

Exercise 2:

Let the Joukowski function $w = f(z) := \frac{1}{2}\left(\frac{z}{4} + \frac{4}{z}\right)$ be given.

a) Determine the images

(i) of the circumference $|z| = 5$,

(ii) of the ray $\mathrm{Re}(z) < 0$, $\mathrm{Im}(z) = 0$,

(iii) of the ray $\mathrm{Re}(z) = 0$, $\mathrm{Im}(z) < 0$.

b) Compute the inverse function $z = f^{-1}(w)$ for $|z| > 4$.

Hand in until: 5.5.