Complex functions for Engineering Students

Homework 4

Exercise 1:

For the inverse $w = f(z) := \dfrac{1}{z}$ with $z \neq 0$ determine the image

a) of the line $\mathrm{Re}(z) = 2$,

b) of the ray $\mathrm{Re}(z) > 0 \wedge \mathrm{Im}(z) = 0$,

c) of the circumference $|z| = 3$,

d) of the circumference $|z - 2i| = 2$ and

e) of the circumference $|z - 2i| = 1$.

Exercise 2:

Let the points
$$z_1 = 1, \ z_2 = 1 + 2i, \ z_3 = i$$
and
$$w_1 = 0, \ w_2 = 1 + i, \ w_3 = -1 - i$$
be given.

a) Compute the Möbius transformation T such that for $j = 1, 2, 3$ it holds:
$$w_j = T(z_j).$$

b) Do $z_0 = 2 + i$ and z_1, z_2, z_3 lie on a (generalized) circle K?

c) Do $w_0 = T(z_0)$ and w_1, w_2, w_3 lie on a (generalized) circle $T(K)$?

Hand in until: 26.5.