

MA 713
Reading and Exercises
Week ending January 19

Reading:

Class 1 (1/17): Ahlfors pp. 1–11

Class 2 (1/19): Ahlfors pp. 12–20

Exercises to be submitted for grading on Friday, January 26:

Class 1 (1/17):

Ahlfors Exercise 3 on p. 9

Ahlfors Exercise 1 on p. 11

Class 2 (1/19):

Ahlfors Exercise 3 on p. 16 (roots in algebraic form)

Additional Exercise 1: In class, we defined the map $\varphi_1(z) : \mathbb{C} \rightarrow S^2 \subset \mathbb{R}^3$ to be the inverse of stereographic projection. Define a similar map $\varphi_2(z) : \mathbb{C} \rightarrow S^2$ that omits the “south pole” and that satisfies

$$\varphi_1^{-1} \circ \varphi_2(z) = \frac{1}{z}$$

for all $z \neq 0$.

Additional Exercise 2: Prove that stereographic projection is a conformal map. (Recall that stereographic projection takes lines and circles in \mathbb{C} to circles on S^2 . To show that it is conformal, it is enough to show that it preserves the angles between any two intersecting lines in \mathbb{C} when it maps those lines to circles on S^2 . Either a geometric or an analytic proof is acceptable.)

Optional exercises:

Class 1 (1/17):

Ahlfors Exercises 1 and 2 on p. 6

Ahlfors Exercises 1 and 5 on p. 8

Ahlfors Exercise 3 on p. 11

Class 2 (1/19):

Ahlfors Exercise 2 on p. 15

Ahlfors Exercise 4 on p. 16

Ahlfors Exercises 1 and 5 on the bottom of p. 17