

**MATH 402 Non-Euclidean Geometry**  
Last Homework

**Due Friday 12/4.**

1. Consider the points  $z_0 = 1 + i$  and  $z_1 = 2 + 2i$  in the upper-half plane  $\mathbb{H}$ . Write down an equation for the hyperbolic line between  $z_0$  and  $z_1$ .
2. Do the same exercise now for the points  $z_0 = 1 + i$  and  $z_1 = 1 + 2i$ .
3. Determine *all* Möbius transformations which preserve the upper-half plane  $\mathbb{H}$  and fix the point  $i$ .

**Hint:** Describe them compactly using the parameter  $\alpha = \frac{a}{b}$ .

4. Choose two theorems from Chapter 7 or 8 that we studied in the Poincaré model of hyperbolic geometry, then re-write and illustrate them in the *Klein model*.