Geometry III/IV

Exercises: Week 14, Feb 2013

This is a marked homework assignment!

Due: Friday, February 15.

Part A

Problem 1. Let T be a spherical triangle with side lengths $a = \frac{\pi}{2}$, $b = \frac{2\pi}{3}$, $c = \frac{3\pi}{4}$. Find the angle of T opposite to the side b.

Problem 2. Find the cross-ratio of the points $1, 2, 3, 4$.

Problem 3. Write the Möbius transformation $f(z) = -2z$ as a composition of inversions and reflections.

Problem 4. Find a Möbius transformation mapping the disk $|z| < 1$ to the half-plane $\Re z > 2$.

Part B

Problem 5. I_0 is an inversion with respect to the circle $|z| = 1$. I_1 is an inversion with respect to the circle $|z - 1| = 1$. What type is the Möbius transformation $I_1 \circ I_0$?

(Hint: try to find a geometric solution, without writing the formulas).