THE CHINESE UNIVERSITY OF HONG KONG
Department of Mathematics
MMAT 5120 Topics in Geometry 2021-22
Lecture 6 practice problems
25th February 2022

- The practice problems are meant as exercise to the students. You are **NOT** required to submit your solutions, but you are encouraged to work through all of them in order to understand the course materials. The problems will be uploaded on Fridays and solutions will be uploaded on Wednesdays before the next lecture.
- Please send an email to **echlam@math.cuhk.edu.hk** if you have any questions.

1. Let $T(z) = \frac{1}{z}$.
   (a) Find the fixed points of T.
   (b) Find the normal form of T.
   (c) Sketch the Steiner circles of first and second kind with respect to the fixed points of T, and use arrows to indicate the actions of T.
2. Let $T(z) = \frac{z}{(1+i)z+i}$.
   (a) Find the fixed points of T.
   (b) Find the normal form of T.
   (c) Sketch the Steiner circles of first and second kind with respect to the fixed points of T, and use arrows to indicate the actions of T.
3. A Mobius transformation T is an involution if it is not the identity and $T \circ T = \mathrm{Id}$, i.e. it is its own inverse. For example $\frac{1}{z}$ is an involution. Prove that an involution is always elliptic.
4. Find a parabolic transformation that fixes $2 + i$ and $T(\infty) = 8$.