**1.** Henle 4.1

**2.** Henle 4.2

**3.** It is convenient to describe a line in terms of a point on the line ($w \in \mathbb{C}$) and a direction parallel to the line ($v \in \mathbb{C} \setminus \{0\}$). In this spirit we define the line $L_{w,v}$ as the set of points

$$L_{w,v} = \{w + tv : t \in \mathbb{R}\}.$$

Furthermore, a set $A$ of points in $\mathbb{C}$ is a line if there exist $w \in \mathbb{C}$ and $v \neq 0$ with $A = L_{w,v}$.

Show that lines are preserved under Euclidean transformations.

**4.** Let $z$ and $w$ be two points in the plane. Show that there is a Euclidean transformation that takes $z$ to zero and takes $w$ to a point on the real axis.

**5.** Let $b$ be a positive real number. Show that the set of points in $\mathbb{C}$ that are equidistant to $-b$ and $b$ is the set of imaginary numbers (i.e. the numbers with $\overline{z} = -z$).

Quickly conclude (using the preceeding exercises) that the set of points equidistant to any two distinct complex numbers is a line.

**6.** Henle 4.3

**7.** Henle 4.4