Complex Analysis Chapter 1 Exercises

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1. Describe geometrically the sets of points z in the complex plane defined by the following relations:

    (a) $|z - z_1| = |z - z_2|$ where $z_1, z_2 \in \mathbb{C}$.
    A line going passing through the intersection of the circles $|z - z_1| = r$ and $|z - z_2| = r$.

    (b) $1/z = \overline{z}$.

    (c) $\operatorname{Re}(z) = 3$.
    All complex numbers of the form $z = 3 + bi$, where $b \in \mathbb{R}$. Geometrically, this is a vertical line at 3.

    (d) $\operatorname{Re}(z) > c$ where $c \in \mathbb{R}$.
    All complex numbers of the form $z = c + bi$, where $b \in \mathbb{R}$. Geometrically, everything to the right of the vertical line at c.

    (e) $\operatorname{Re}(az + b) > 0$ where $a, b \in \mathbb{C}$.

    (f) $|z| = \operatorname{Re}(z) + 1$.

    (g) $\operatorname{Im}(z) = c$ with $c \in \mathbb{R}$.
    All complex numbers of the form $z = a + ci$, where $a \in \mathbb{R}$. Geometrically, this is a horizontal line at ci.