Math 431 Complex Analysis Spring 2020 HW 2

- (1) Chapter 2 Q 1,5,12
- (2) Chapter 3 Q 4,7,11,12,13
- (3) Determine the geometrical effect on the complex plane of the following transformations.
 - (a) (i) Show that the general equation of a straight line in \mathbb{C} is $Bz + \overline{B}\overline{z} + C = 0$, where $B \in \mathbb{C}$ and $C \in \mathbb{R}$.
 - (ii) Show that the general equation of a circle in \mathbb{C} is $A |z|^2 + Bz + \overline{B}\overline{z} + C = 0$, where $A, C \in \mathbb{R}, B \in \mathbb{C}, A \neq 0$ and $|B|^2 > AC$. Where does the condition $|B|^2 > AC$ come from?

Hint: in (a) write the equation for a straight line in \mathbb{R}^2 and use $x = (z+\overline{z})/2$ and $y = i(z+\overline{z})/2$. In (b) use $(z-c)(\overline{z}-\overline{c}) = |z-c|^2$ to define the equation of a circle centered at c.

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