HomeWork #1

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P. 1. Prove there does not exist an order relation $\prec$ on $\mathbb{C}$ such that $(\mathbb{C}, +, \cdot, \prec)$ is an ordered field.

HomeWork #2

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P. 1. Find the loci of points satisfying:

a) $Re\left(\frac{1}{z}\right) > \frac{1}{2}$

b) $|z^2 - 1| = \alpha\ , \quad \alpha > 0$

P. 2. Let $M = \{x \mid 0 \le x \le 1\ ,\quad x = 0.x_1x_2x_3\cdots,\ x_i \text{ odd}\}$, i.e., M is the set of numbers between 0 and 1 (inclusively) with infinite decimal representations all of whose digits are odd.

Question. Is M closed?

P. 3. Suppose $\{z_n\} \to \zeta$. Show $z_n' = \dfrac{z_1 + z_2 + \cdots + z_n}{n} \to \zeta$.

Homework #3

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P. 1. Let $f(z) = \exp(-1/|z|)$. Show that this function is uniformly continuous on $D = \{z : 0 < |z| < 1\}$.

P. 2. Show that $e^z > 1 + z$ for $z \in \mathbb{R},\ z \neq 0$.

P. 3. Find all solutions of:

a) $\cos z = 2i$

b) $\sin z = 10$

Homework #4

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P. 1. The domain $|z| < 1$ is mapped onto the upper half-plane by a bi-linear transformation which takes 1, *i*, -1 into 0, 1, ∞, respectively. Find the mapping. What are the images of the radii of the unit circle leading (from 0) to the points 1, *i*, -1, -*i*?

P. 2. Let $D = B(0,1)$ and $E = B(0,1)\backslash\overline{B}(-½,½)$. Find the unique one-to-one, conformal mapping $f : D \to E$, $f(0) = ½$, $f'(0) > 0$.

P. 3. Let $D = B(0,1)$ and $E = B(0,1)\backslash(-1,-½]$. Find the unique one-to-one, conformal mapping $f : D \to E$, $f(0) = 0$, $f'(0) > 0$.

Homework #5

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P. 1. Verify the parenthetical comment on page 98:

To show the second equality above takes a little effort, although for γ smooth it is easy. The details are left to the reader.