In-class

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Work carefully. Do your own work. **Show all relevant supporting steps!**

1. Find $(1 - i)^{14}$.

2. Suppose $z = -2\bar{z}$. Characterize $z$.

3. Prove or disprove: $A \cap \overline{B} = \overline{A \cap \overline{B}}$

4. Prove: $\mathbb{C}$ is complete.

5. Prove: Every sequentially compact metric space is complete.

6. Prove: $d(x, A) = d(x, \overline{A})$.

7. Definition: A point $z \in A \subset \mathbb{C}$ is said to be isolated in $A$ if there exists a ball $B(z, r)$ such that $B(z, r) \cap A = \{z\}$. Prove: If $M = \bigcup_{\lambda \in \Lambda} z_{\lambda}$ and each $z_{\lambda}$ is isolated in $M$, then $M$ is countable.

8. Prove: If $z, w \in \mathbb{C}$ and $zw = 0$, then either $z = 0$ or $w = 0$.

9. Prove: If $\sum_{n=1}^{\infty} u_n$, is convergent, then there exists an $M$ such that $|u_n + u_{n+1} + u_{n+2} + \cdots + u_{n+p}| < M$, for all $n$ and $p$.

10. Is $f(z) = f(x + iy) = x - iy$ differentiable anywhere on $\mathbb{C}$? analytic anywhere on $\mathbb{C}$?