Homework 3

A portion of the following problems will be graded according to the provided rubric.

1. Rudin pg 44 problem 11
2. Let $E = [0,1] \cup (2,3)$
    a. What are the limit points of E?
    b. What are the isolated points of E?
    c. What is the interior of E?
    d. What is the closure of E?
    e. Is E open, closed, clopen, or not open and not closed?
    f. Find the boundary of E.
3. Prove that in any metric space (X, d) the sets X and $\emptyset$ are clopen.
4. Rudin pg 43 problem 9 parts a, d, e, and f
5. Find two sets of real numbers A and B such that $A \cap B = \emptyset$ and $\bar{A} \cap \bar{B} \neq \emptyset$.
6. Rudin pg 43 problem 7
7. Let $E \subset \mathbb{R}$ be nonempty and bounded below. Show that $\inf(E) \in \overline{E}$.
8. Let (X, d) be a metric space and $E \subset X$. Show that:
    a. E° is the union of all the open subsets of E
    b. $\overline{E}$ is the intersection of all the closed supersets of E
9. Prove that the complement of any $\mathcal{F}_\sigma$-set is a $\mathcal{G}_\delta$-set.