Contents

1 Some Concepts from Calculus and ODE's

1.1

Prove that a closed set contains all of its boundary points while an open set contains none of its boundary points.

Proof. Let $A \subset \mathbb{R}^n$ be a closed set. This implies that A contains all of its limit points. Now suppose the point $x \in \mathbb{R}^n$ is a boundary point of the set A. This implies that every ball with center at x contains points of A and points of A^c. It then follows, from the definition of a limit point, that x is itself a limit point of A. Then since we know A contains all of its limit points then it follows that $x \in A$, as desired.

Now let $A \subset \mathbb{R}^n$ be an open set. This implies that every point of A is an interior point, futher implying that A contains none of its limit points. Since we just showed that boundary points are also limit points, it must be that A contains none of its boundary points, as desired. □