Midterm Study Guide Real Analysis

December 5, 2017

1 ch1

1.1 sup and inf 1.8

DEF: Suppose S is an ordered set, $E \subset S$, and E is bounded above. $\alpha = \sup(S)$ has the following properties:

(i.) α is an upper bound of E.

(i.) if $x < \alpha$ then x is not an upper bound of E.

1.2 Least-upper-bound property 1.10

DEF : An ordered set S is said to have the least-upper-bound property if the following is true: $E \subset S, E \neq \emptyset$, and E is bounded above, then $sup(E) \in S$

1.3 THM 1.11

THM : Suppose S is an ordered set with the least-upper-bound property, $B \subset S$, B is nonempty, and B is bounded below. Let L be the set of lower bounds of B. Then

$$\sup(L) = \inf(B)$$

That is to say that the supremum of the set of all lower bounds of B is equivalent to the infemum of B.

1.4 thm 1.20

1. **ARCHIMEDIANPROPERTY : If $x \in \mathbb{R}$, and $x > 0$, then there exists a positive integer n s.t.**

$$nx > y$$

2. **if $x \in \mathbb{R}$, and $x < y$, then there exists a $p \in \mathbb{Q}$ s.t. $x < p < y$.**

1.5 Euclidean Spaces 1.36

DEF :