Analysis Lab 1

Topic: Boundedness of Sets

Guidelines for Lab Report

For this lab, submit a report according to guidelines given below.

1. A copy of the table from Section 2 is provided on the next page. Enter your findings in this table, and submit this with the rest of your report.

2. In Question 7, use your answers to Questions 1-6 to identify which statement is false and which is true. For the statement that is false, provide a counterexample. For the statement that is true, discuss why it seems to be reasonable. Write your responses in the space provided on page 3. Attach additional sheet(s), if necessary.

3. In Question 10, use your answers to Questions 8 and 9 in Section 3 to identify which statement is true and which is false. For the statement that is false, provide a counterexample. For the statement that is true, provide a proof. Write your responses in the space provided on page 4. Attach additional sheet(s), if necessary.

4. In Question 13, use your answers to Questions 11 and 12 in Section 3 to determine which statement is true and which is false. For the statement that is false, provide a counterexample. For the statement that is true, provide a proof. Write your responses in the space provided on page 5. Attach additional sheet(s), if necessary.

5. Complete the Questions for Reflection as assigned by your instructor. Write your response for each question on a separate sheet(s), and attach to the rest of this report.

6. Write an overall summary of this lab. Explain what you learned that is new, discuss how your conceptions of boundedness may have changed as a result of having worked through the exercises in this lab, and discuss your understanding of the relationships between supremum (infimum), maximum (minimum), and bounded above (below). Write this on a separate sheet, and attach this to the rest of this report.

2 Using Examples to Enhance Understanding

Place your entries in the appropriate cells.

Set	Upper bound	Lower bound	Max	Min	Sup	Inf	Is the sup in the set?	Is the set bounded?
1) $\{x \in \mathbb{R} : 0 \leq x < 1\}$								
2) $\{x \in \mathbb{R} : 0 \leq x \leq 1\}$								
3) $\{x \in \mathbb{R} : 0 < x < 1\}$								
4) $\{1/n : n \in \mathbb{Z} \setminus \{0\}\}$								
5) $\{1/n : n \in \mathbb{N}\}$								
6) $\{x \in \mathbb{R} : x < \sqrt{2}\}$								
7) $\{1, 4, 7, 97\}$								
8) $\left\{(-1)^n\left(2-\frac{1}{n}\right) : n \in \mathbb{N}\right\}$								
9) $\{\ln(x) : x \in \mathbb{R}, x > 0\}$								
10) $\{n^{1/n} : n \in \mathbb{N}\}$								
11) $\{\arctan(x) : x \in \mathbb{R}\}$								
12) $\{(-1)^n : n \in \mathbb{N}\}$								
13) $\{e^x : x \in \mathbb{R}\}$								

3 Critical Thinking Questions

Question 7: In the space provided, explain which statement is true and which is false. Provide a counterexample to the statement that is false, and provide an explanation for the statement that is true. Attach an additional sheet, if necessary.

Section 3, Question 10: In the space provided, explain which statement is true and which is false. Provide a counterexample to the statement that is false, and write a proof for the statement that is true. Attach an additional sheet, if necessary.

Section 3, Question 13: In the space provided, explain which statement is true and which is false. Provide a counterexample to the statement that is false, and write a proof for the statement that is true. Attach an additional sheet, if necessary.