

# Analysis Lab 10

**Topic: Another Definition of Continuity**

## Guidelines for Lab Report

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

1. For Section 2, complete Questions 1 and 2 by filling in each cell of the table provided on page 2 of this report guide.
2. For Section 3, submit your answers to Questions 1-8 on page 3 of this report guide.
3. For Section 4, complete Questions 1-3 by filling in the table provided on page 4 of this lab report guide, and write your answers to Questions 4-7 in the space provided below the table.
4. Complete the Questions for Reflection as assigned by your instructor. Write your response to each question on a separate sheet(s), and attach to the rest of this report.

## 2 Using Examples to Enhance Understanding

$f_i, x_0$	$f(x_0)$	C/NC	$\epsilon = 1$	$\epsilon = .5$	$\epsilon = .1$	$\epsilon = .01$
$f_1(x) =  x , \quad x_0 = 0$						
$f_2(x) = \begin{cases} \frac{x^2 - 16}{x - 4}, & \text{if } x \neq 4 \\ 31/4, & \text{if } x = 4 \end{cases}, \quad x_0 = 4$						
$f_3(x) = \begin{cases} x^2, & \text{if } x < 1 \\ 1, & \text{if } x = 1 \\ 2x - 49/50, & \text{if } x > 1 \end{cases}, \quad x_0 = 1$						
$f_4(x) = \begin{cases} \sin\left(\frac{1}{x}\right), & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}, \quad x_0 = 0$						
$f_5(x) = \begin{cases} x \sin\left(\frac{1}{x}\right), & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}, \quad x_0 = 0$						
$f_6(x) = \begin{cases} 1/x, & \text{if } x \neq 0 \\ 2, & \text{if } x = 0 \end{cases}, \quad x_0 = 0$						
$f_7(x) = \begin{cases} 0, & \text{if } x \in \mathbf{Q} \\ 1, & \text{if } x \notin \mathbf{Q} \end{cases}, \quad x_0 = 0$						

### **3 Critical Thinking Questions**

In the space provided, write your answers to Questions 1-8. Attach additional sheet(s), if necessary.

## 4 Definition of the Limit of a Function

Complete Questions 1-3 below by filling in the appropriate cells of the table given below.

$h_i, x_0$	$L$	$L = h_i(x_0)?$	$\epsilon = .5$	$\epsilon = .1$
$h_1(x) = \frac{x^2 - 9}{x - 3}, \quad x_0 = 3$				
$h_2(x) = \begin{cases} 3 - x, & \text{if } x < 1 \\ 1, & \text{if } x = 1 \\ 3x - 1, & \text{if } x > 1 \end{cases}, \quad x_0 = 1$				
$h_3(x) = \frac{x - 4}{\sqrt{x} - 2}, \quad x_0 = 4$				
$h_4(x) = x \sin\left(\frac{1}{x}\right), \quad x_0 = 0$				

Complete Questions 4-7 in the space provided below. Attach additional sheet(s) if necessary.