**Math 382 2nd Semester 2016-2017**

**Mid-Exam 2 4/5/2017**

**Duration: 90 Minutes**

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**Question 1:**

1. State the definition of continuous function at a point c. [Definition 6.1]
2. State the definition of a right hand limit of a function f at a point c. [Definition 5.2]
3. Give an example of two functions one of which is not continuous at c but the composition is continuous at c.

**Question 2:**

1. Let and . Prove that if for any sequence in , and satisfy , **then**  [Theorem 5.1].
2. Let satisfy the relation for all If for some **Prove that f has a limit at every point in** [ Exercise 9 in section 5.2]

**Question 3:**

1. Prove that[Example 5.8]
2. Let an isolated point in **Show that is continuous at**  [Note after Definition 6.1]
3. Prove that if a function is continuous at a point then so is the function . [Example 6.11].

**Question 4:**

1. Find the limit if it exists. Write all the details
2. where . [exercise 5 in section 5.1]
3. Explain why we cannot find two functions for which is continuous at but is not continuous at **But the sum is continuous at.**
4. Explain why we cannot find two functions both are continuous at c, but the **composition is not continuous at c.**