**Department of Mathematics**

**College of Sciences**

**King Saud University**

**Math 382**

**Final Exam**

**Second Semester, 1436-1437H**

**Time: 3 hours.**

|  |
| --- |
| **Name:** |
| **Student No.** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Question number** | I | II | III | IV | Total |
| **Mark** |  |  |  |  |  |

# Question I

# Find the limit if it exist, Justify your answer:

2. (Hint: show that is monotone and bounded and then find the limit)
3. i) Let , find

ii) Prove that the set is not closed.

1. Let . Show that

# Question II

The closure of any set is denoted by and is defined to be the intersection of all closed sets containing

where

1. Show that if is closed, then
2. Prove that is closed.
3. . [Hint: prove first that .

**Question III**

**Prove the following:**

1. Every natural number greater than one is the product of prim numbers. (Theorem 2.4).
2. Let prove that such that (exercise 8 sec. 2.4)
3. If a sequence converge, then the limit is unique. (Theorem 3.1).
4. If and are Cauchy sequences then is a Cauchy sequence.

**Question IV**

1. **Define** uniform continuity of on A **and prove that is uniformly continuous on [0,2].**
2. Give an example of a function which is continuous but not uniformly continuous.
3. Find the where