**Department of Mathematics**

**College of Sciences**

**King Saud University**

**Math 382**

**First Midterm Exam**

**Second Semester, 1435-1434H**

**Time: 90 min.**

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

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

# Question I

1. Let . Find, with proof, Sup S and inf S.
2. State and prove the density theorem of the rational numbers.

# Question II

Find the limit if it exists:

1. Lim bn, where 0<b<1.
2. Lim .

1. Lim .
2. Lim .

**Question III**

* 1. Prove that every convergent sequence is bounded.
  2. Prove that if  is a bounded increasing sequence, then .

**Question IV**

Prove or disprove the following, where A is a subset of R and (xn) is a sequence of real numbers.

1. If Sup A exists then Sup kA=k Sup A, for any real number k.
2. If exists then  exists.
3. Inf A= - Sup A.

(d) if (yk) is a subsequence of (xn) such that lim yk=c then lim xn=c.

(e) 5 is an upper bound of .