**MACHAKOS UNIVERSITY**

**SMA 300: REAL ANALYSIS I**

**CAT 1(25 ) marks**

1. Give definitions of each of the following .In each case give an example.
2. Rational number. (2 marks)
3. Neighborhood of a point. (2 marks)
4. Open set . (2marks)
5. Limit point. (2marks)
6. Closed set (2marks)
7. For each of the following sets determine the largest such that it contains an - neighborhood about .
8. (ii) , . (iii) (6marks)
9. Prove that if and are neighborhoods of a point , then is also a neighborhood of the point . (5marks)
10. Prove that the square of an odd integer is odd. (4marks)

**CAT 2 (25 ) marks**

1. The following are subsets of :
2. (ii) (iii)

For each set determine the Supremum, Infimum, Maximum value and Minimum value

(7marks)

1. Define the concept of a closed subset of . (1mark)
2. If are closed subsets of prove that is a closed subset of i.e any finite collection of closed sets is closed . (4marks)
3. Let , . Find:
4. 2. 3 . 4. (4marks)
5. (a) Prove that an arbitrary collection of open sets is open. (4marks)

(b) Prove that a finite intersection of open sets is open, hence pick a counter example to verify that an arbitrary intersection of open sets is not necessarily open. (5marks)