MAA 3200 – INTROD TO ADV MATH                              FLORIDA INT'L UNIV.

Review for Test #2     REMEMBER TO BRING AN 8’’x11”  BLUE EXAM BOOKLET

KEY CONCEPTS AND MAIN DEFINITIONS:

Injective (one-to-one), surjective (onto), and bijective functions; compositions and inverses of functions, images and inverse-images of a set under a function,  Generalized Cartesian product, Finite sequences, n-ary relations, n-ary functions, vector valued functions, First Principle of  Mathematical Induction, Basis, Induction step, Conclusion, Second (Strong) Principle of Mathematical Induction, Definition of a function by Recursion, Construction of the Natural numbers as special sets, Operations & relations on the natural numbers, Construction of the Integers as equivalence classes of ordered pairs of natural numbers, Operations & relations on the integers, Construction of the Rational numbers as equivalence classes of ordered pairs integers with the second element being non-zero, Operations & relations on the rational numbers, Equi-numerous sets, finite and infinite sets; countable and uncountable sets, denumerable (countably infinite) sets, Cantor’s Diagonal theorem, Cantor-Schroeder Bernstein theorem; upper bounds and lower bounds of a set of real numbers; least upper bound (l.u.b., supremum) and greatest lower bound (g.l.b., infimum) of a non-empty sets, infinite sequences, the epsilon-N method, convergent & divergent sequences, bounded sequences, arithmetical properties of limits of sequences. Increasing & decreasing functions, subsequences, Cauchy sequences, Construction of the Real numbers …. [accumulation points of a set of real numbers, the limit of a function as x approaches an accumulation point, the epsilon-delta method, the algebra of limits].

MAIN PROBLEM SOLVING TECHNIQUES:

1. Proving results about compositions of functions & finding inverses of bijections.

2.   Proving results about the images and inverses images of a set under a function.

3. Proving results by using the First Principle of Mathematical Induction.

4. Proving results by using the Second Principle of Mathematical Induction and defining

functions by using the Recursion Principle.

 5.   Proving certain results about equi-numerous, finite, and infinite sets.

6.   Proving certain results about countable, denumerable, and uncountable sets.

 7.    Finding the supremum and infimum and proving results about supremum and infimum

        of non-empty sets of real numbers.

 8.  Proving results about infinite sequences and arithmetical operations on infinite

      sequences by using the epsilon-N method.

 9.  Proving results about increasing, decreasing, and Cauchy sequences by using the

      epsilon-N method.  
 [10. Proving results about accumulation points, about limits of functions, and about the

         algebra of limits by using the epsilon-delta method.]