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

Review for Test #1      REMEMBER TO BRING AN 8’’x11”  BLUE EXAM BOOKLET

KEY CONCEPTS AND MAIN DEFINITIONS:

Propositional logic, propositional symbols, logical connectives: ¬ (negation), ˅ (or), ˄ (and), → (conditional), ↔ (bi-conditional), ⊕ (exclusive or); propositional formula, tautology, contradiction, ⇔ (logically equivalent),  ⇒ (logically implies), Predicate logic, for all quantifier (∀x), there exists quantifier (∃x), formulas of  predicate logic, logically valid formulas, Bounded quantifiers (∀x∈A) and (∃x∈A), Uniqueness quantifier (∃!x); Axioms of Set Theory; membership relation x∈A, Empty set ∅, subset relation A⊆B, power set P(A), intersection A***∩***B, union A∪B, relative complement A−B, symmetric difference AΔB = (A-B)∪(B-A), universal set U, complement Ac = U-A, (natural numbers), ℤ, ℚ, (real numbers), (complex numbers); Families of sets, Indexed families of sets, union and intersection of indexed families of sets, proof strategies, proof by contradiction, counter-examples, Pairs & ordered pairs, Cartesian product A×B of two sets, Relations; domain & range of a relation, inverse of a relation, compositions of relations;  Relations from A to B & Relations on A; Reflexive, symmetric, anti-symmetric, transitive, & circular relations; Equivalence relation R on a set A, equivalence classes of R, A modulo R, Partitions of A,  Functions; Domain & range of a function, Codomains of a function, Functions from A to B & Functions on A, Partial functions from A to B, Injective functions (one-to-one functions, injections), Surjective functions (onto functions, surjections), Bijective functions (one-to-one & onto functions, bijections), composition of functions. ∀ ∃ Δ ⊕ ⊆ ∈ ∉ ⊂ → ¬ ≠ ∞ ∅ ≡ ≈ ↔ ≤ ⁄ × ℵ √ ∇ ⇔ ⇒ ≅ # ⊥ ± ≥ ≤ ° ↑ ↓ ∪ ∪ − ***∩*** P ⊗

MAIN PROBLEM SOLVING TECHNIQUES & TYPES OF PROOFS:

1. (a) Determining if A is logically equivalent to B by using truth tables in Prop. Logic.

       (b) Determining A logically implies B by using truth tables in Propositional Logic.

2. (a) Translating English & Mathematical statements into formulas of Propositional Logic.

(b) Determining whether or not an argument is logically valid using truth tables.

3. (a) Translating English & Mathematical statements into formulas of Predicate Logic.

(b) Determining if a formula A is logically equivalent to B or if A logically implies B.

(c) Moving the ¬ sign so that it governs no quantifiers & other connectives in Pred. Logic.

4. (a) Proving that certain identities and subset relations involving sets are true.

(b) Proving that certain identities and subset relations involving indexed families of sets.

5. (a) Proving identities or subset relations involving the Cartesian products.

(b) Proving results about properties involving inverses and compositions of relations.

6. (a) Proving that a given relation R is an equivalence relation on A.

(b) Finding the equivalence classes into which A is partitioned by an equiv. relation R on A.

7.  (a) Finding the domain and the range of a function.

(b) Proving facts about functions and compositions of functions.

8.   (a) Determining if a function is injective, surjective, bijective, or none of these.

(b) Proving facts about injective, surjective & bijective functions – and finding inverses.