MATH 115

"Foundation of Mathematics II"

1. Relations
    - Type of Relations: Reflexive, Symmetric, Transitive, Anti-Symmetric
    - Equivalence Relations, Equivalence Classes, Properties of Equivalence Classes, Partition
2. Ordering
    - Partial Order and Total Order
    - Least Element and Greatest Element
    - Bounded Set: Upper Bound, Lower Bound Least Upper Bound, Greatest Lower Bound
    - Complete Set
    - Well Ordered Sets
3. The Natural Numbers N
    - Peano's Axioms
    - Arithmetic of the Natural Number: The Addition on N, The Multiplication on N
    - Properties: Associative Law of Addition and Multiplication, Commutative Law of Addition and Multiplication, Distribution Law, Cancelation Law of Addition and Multiplication
    - Ordering on N, N is Well Order Set
4. The Integer Number Z
    - Construction of Integer
    - The Addition and Multiplication on Z
    - Properties: Associative Law of Addition and Multiplication, Commutative Law of Addition and Multiplication,
    - Ordering on Z
    - Embeddeing

5. Rational Numbers Q
    - Construction of the Rational Numbers
    - Addition and Multiplication on Q and Its Properties
    - Ordering on Q, Dense Order
6. The Real Numbers
    - Completeness Property of R
7. The Complex Number $\not\in$
    - Addition and Multiplication $\not\in$
8. Properties of the Integer Numbers
    - Divisibility and Primes
    - Greatest Common Divisor and Least Common Multiple
    - The Fundamental Theorem of Arithmetic
9. Groups
    - Binary Operation
    - Definitions: Groups, Commutative Group, Subgroup, Order of Group

Books:

1. اسس الرياضيات، تأليف: د. هادي جابر، د.رياض شاكر، د. نادر جورج
2. Fundamental Concepts of Modern Mathematics, by Max D. Larsen