Discrete Mathematics 2

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Graphs

- Terms and Notation
- Representations
- Isomorphisms, Isomorphic, Prove vs. Disprove
- Walks, Trails, Circuits, Path, Cycles
- Connectivity
- Matrices
  - Size of a Matrix (first down)
  - Indexing of Matrix Elements (first down)
  - Addition of Matrices
  - Scalar Product Operation in Matrix Form
  - Matrix Multiplication (check sizes first; then, form all scalar products)
  - Notation: s scalar, M matrix, $\boldsymbol{x}$ column vector, $\boldsymbol{x}^T$ row vector
- Adjacency Matrix A, Boolean Algebra, Walks, and Transitive Closure
- Weight Matrix W, Min-Plus Algebra, and Shortest Paths
- What is encoded in A^k and W^k?

Trees

- Definition Tree
- Terms: Free Tree, Rooted Tree, ...
- Applications: Game Trees, Huffman Codes, (Counting)
- Properties Trees: Theorems
- Traversals: Pre-Order, Post-Order, In-Order

Finite Automatons

- Understanding Description as Drawing

- Alphabet, Kleene Operations, Strings, Language
- Encoding of Structure (5-Tuple)
- Definition of Dynamics (Recursive Transition Function)
- Acceptance of Input String
- Notation: x character; $\boldsymbol{x}$ string

Boolean Algebra

- Boolean Functions
- Input/Output Tables vs. Boolean Expressions
- Boolean Algebra Laws
- Minterms and Maxterms
- DNF and CNF