CS 65 Final Review, Fall 2008

These concepts were either discussed in lecture or represented in the assignments.

Functional programming concepts
- Functions
- Lists, association lists, functions dealing with these
- Possible data representations for directed graphs, matrices
- Anonymous functions, lambda expressions, Currying
- Recursion, Mutual recursion, Tail recursion
- Accumulator arguments

KWIC Index
Directed graph cycle test
Dijkstra's algorithm
Interpreter for logic functions
- Using environments to represent variable binding

Logic functions, identities, simplification
- Minterm expansion
- Boole-Shannon expansion
- Simplification using hypercubes and Karnaugh maps
- Combinational logic implementation using gates

Typical combinational elements, such as adder, multiplexor, encoder, decoder
Sequential logic, finite-state-machines, Mealy/Moore, acceptors (DFA, NFA)
- Tabular representation
- Labeled graph representation
- Gate implementation

Typical sequential elements, such as register, counter
Regular expressions
- Uses for string matching
- Derivatives
- Conversion to finite-state acceptor
    - Using derivatives
    - Using NFA to DFA conversion (non-deterministic machines)

Cross product machines
- Implementing Boolean operators, such as intersection, equality check

Non-regular languages
- How to show a language is non-regular

These concepts were discussed after the midterm exam.

Unicalc application
Data structures:
Hashtable
- Linked list
- Stack

- Queue
- Deque
- Priority Queue (one form of heap)

Sorting algorithms
- Bucket sort
- Radix sort
- Merge sort
- Heap sort

Searching
- Depth-first
- Breadth-first
- Iterative deepening

Computer Architecture
- Assembly language

Garbage collection and reference counting

Threads (in Java)

Turing machines
- Representation as numerals
- Universal Turing machine
- Halting problem

Reduction of one unsolvable problem to another

Rice's theorem

Logic programming
- Database
- Clauses
- Unification
- Lists
- Numeric operations
- Generate & test
- Backtracking