Introduction to Digital Logic

- Review for Exam I

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Topics

- Voltage and Current
  - Switches, Transistors, Gates
- Binary, hexadecimal
- Boolean Algebra
  - Properties, Consensus Theorem, Duals, De Morgan
- Drawing circuits
  - From truth tables, from equations

Topics

- Minimization
  - Using algebra, Using K-Maps
- Timing Diagrams
- VHDL
  - Entities, Behavior, Components
- Universal Gates
  - Converting circuits to NAND, NOR
- Multiplexors, Decoders

Review Questions

- Convert f4b to binary.
- Convert 123 to binary and hex
- Convert 101101011 to hex and decimal
- Why do computers use binary?

Review Questions

- What is a pull up network? A pull down network?
- Give the transistor level diagram for a 2-input NAND. A 3-input AND. A 2-input XOR.

Review Questions

- You are given the following expression:

$$A'B + (C' + D)' + (AB)'C$$

- Rewrite this expression in sum of products form
- Rewrite this expression in sum of minterms form
- Construct a truth table for this expression
- Construct a circuit for the sum of products form

Review Questions

- You are given the following expression:

$$A'B + (C' + D)' + (AB)'C$$

- Simplify this expression using boolean algebra
- Simplify this expression using a K-map
- Construct a circuit of your simplified expression.
- What is the difference in transistors between your original circuit and your simplified circuit?

Review Questions

- Redraw your circuits using NANDs and NORs.
- What is the difference in transistors between the original circuit and the circuits that use NANDs and NORS?
- Write VHDL code that would implement this circuit.
- Construct a timing diagram for the following inputs:

A'B'CD ABC'D AB'C'D' A'B'CD' A'BCD

Review Questions

- Construct an 8 input mux using 4 input muxes and 2 input muxes.

- Draw a circuit for the following VHDL. Do not use a mux:

```
a <= b or c when b = d else
        d;
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- Redraw the circuit again, this time using a mux.