COMPSCI 1JC3

Introduction to Computational Thinking

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04b Discussion Session

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Admin

- Assignment 1 is due on tomorrow.
- Office hours: To see me please send me a note with times.
- Are there any questions?

Review

1. Truth tables.
2. Satisfiability and tautologies.
3. Logic gates.
4. Ripple adder.
5. Boolean algebra.

Propositional Logic

- A propositional formula is a boolean expression built from boolean variables, constants, and functions.
- Propositional logic is the study of propositional formulas.
- A propositional formula is satisfiable if it is true under some interpretation of its boolean variables.
- A propositional formula is a tautology if it is true under all interpretations of its boolean variables.
- The problem of determining whether a propositional formula is a tautology is decidable!
  - ▸ A decision procedure can be implemented using truth tables or other much more efficient techniques.
  - ▸ This shows Leibniz's dream is partially true.
- Many practical problems can be expressed as satisfiability or tautology problems.

Propositional Formulas (iClicker)

Which of the following Haskell expressions is NOT (always) a propositional formula?

A. `True.`

B. `17 == 19.`

C. `if x then y else z.`

D. `(not x) || y.`

E. `&&.`

Boolean Functions (iClicker)

Which of the following sets of boolean functions is NOT sufficient to define every possible boolean function?

A. $\{\text{not}, \text{and}\}$.

B. $\{\text{and}, \text{or}\}$.

C. $\{\text{not}, \text{and}, \text{or}\}$.

D. $\{\text{and}, \text{nand}\}$.

E. $\{\text{nor}\}$.