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CS 2110: Representations and Bits Cheat Sheet

Topics Covered:

- Number Representations
- Bitwise Operations

We apply constants (masks) with boolean functions

Bitwise Operations

Clear Function

- The **clear** identity puts a zero in any bit that has a zero in the masks wxyz &1111 = wxyz

  wxyz &1101 = wx0z

Known as the **AND** function bc/ it you only get a 1 when both respective bids are equal to 1

Testing Function

- The **set** identity puts a one in any bit you want to set regardless of what is present there where there is a 1 in the masks

  wxyz | 0000 = wxyz

  wxyz | 0100 = w1yz

Known as the **OR** function because if either is one then the result is 1

Toggle Function

- The **toggle** identity toggles any bit with a 1 in the mask's relative position wxyz | 0000 = wxyz

  wxyz | 1000 = w`xyz

  Known as the **XOR** function becase only one bit can be 1 for it to be a 1

Bitwise Operation Tricks

- To test a bit, clear all the rest

$$wxyz \ \&0010 = 00y0$$

Now you can test 00y0 != 0000. True if y is 1, false if y is 0

- To put a 1 in any bit position n in a mask, shift left by n
  - Conversely to put a 0 surrounded by zeroes, complement this

  $1 \ll 2 == 0010$

Shift Operations

idk im too lazy to do shift operations right now