CS-341 Lecture 17

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Combinational Building Blocks

- Decoder
  - n inputs, 2^n outputs
  - Exactly one output true at a time, telling what combination of inputs is true
- Multiplexer
  - n control inputs, 2^n data inputs, one output
  - "Connect" one input to the output
  - Can implement any function of $n+1$ variables
- Half/Full Adder
  - Two data inputs; sum and carry outputs
  - Full adder has carry in

Parallel Adder/Subtracter

- Parallel Adder
  - Link the carry out of one full adder to the carry in of the one to its left.
  - Condition Code values
    - C (carry) is C_{out} of leftmost full adder
    - V (overflow) is *xor* of C_{in} and C_{out} of leftmost full adder
    - N (negative) is Sum output of leftmost full adder
    - Z (zero) is *nor* of all Sum outputs.
- Subtraction
  - *sub* signal negates left operand when asserted
    - Complement all data bits using *xor*
    - Add one by asserting C_0