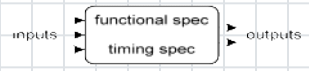
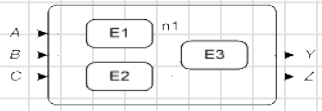
5 - Logic Circuits

Tuesday, May 14, 2024 9:15 PM

LOGIC CIRCUITS

* is composed of



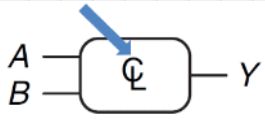


- Nodes - inputs - A, B, C internal - n1
  outputs - Y, Z
- Elements - E1, E2, E3

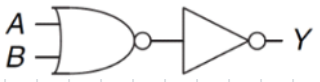
✡ TYPES OF LOGIC

⇨ Sequential Logic - has memory
- Outputs are determined by previous and current values of inputs

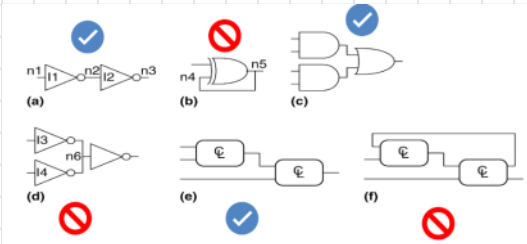
⇨ Combinational Logic - memoryless
- Output is determined by current values of input.
- eg. gates



eg-



✱ Rules to build combinational circuit
- Every element is combinational
- Every node is either an input or connects to *exactly one* output of an element
- The circuit contains no cyclic paths



⇨ Boolean Equations

Functional specification of outputs in terms of inputs

eg- $C_{out} = F(A, B, C_{in})$ w/c could be $C_{out} = AB + AC_{in} + BC$

- N.B - OR = SUM
  - AND = PRODUCT
  - Complement = inverse
  - Literal - a variable or it complement { $A, \bar{A}, \bar{B}, B, C, \bar{C}$
  - Implicant - and of one or more literals
    $A\bar{B}C, AB, \bar{C}B$
  - Minterm - product that includes all input variables
    $ABC, \bar{A}B\bar{C}, \bar{A}\bar{B}C$
  - Maxterm - sum that includes all input variables
    $(A + B + C), (\bar{A} + B + \bar{C}), (\bar{A} + \bar{B} + \bar{C})$

✱ Operator precedence

NOT → AND → OR