

Week 4.

Logic element:

combination \Rightarrow depends only on its current inputs.

sequential \Rightarrow depends on past history and current input

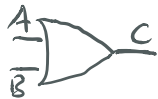
Gates:

AND



$$C = A \cdot B$$

OR



$$C = A + B$$

NOT



XOR. (true only when an



odd number of

$$C = A \oplus B \quad (\text{inputs are true})$$

$$= A \cdot \bar{B} + \bar{A} \cdot B$$

Three-input XOR function:

$$A \oplus B \oplus C = x \cdot \bar{C} + \bar{x} \cdot C$$

$$= \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$

$$x + y \cdot z = (x + y)(x + z)$$

$$x + \bar{x}y = x + y$$

Half-adder: two input, one output and one carry out.

No carry in \Rightarrow two binary numbers addition.

Full-adder: three one-bit binary digits addition.