

1 bit \rightarrow 2 levels

2 bits \rightarrow 4 levels

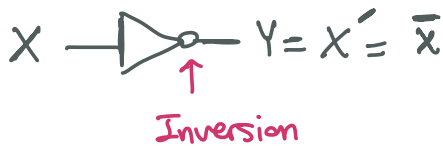
3 bits \rightarrow 8 levels

\vdots

n bits $\rightarrow 2^n$ levels

Logic Gates: Basic building blocks of digital circuits

"NOT" Gate



Truth Table

X	Y
0	1
1	0

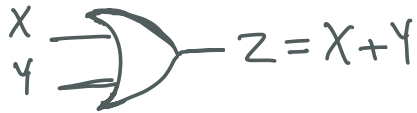


"AND" Gate



X	Y	Z
0	0	0
0	1	0
1	0	0
1	1	1

"OR" Gate



X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	1

"NAND" Gate

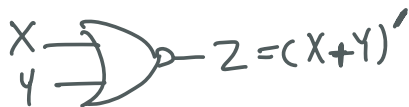


$$Z = (X \cdot Y)'$$

$$= \overline{(X \cdot Y)}$$

X	Y	Z
0	0	1
0	1	1
1	0	1
1	1	0

"NOR" Gate



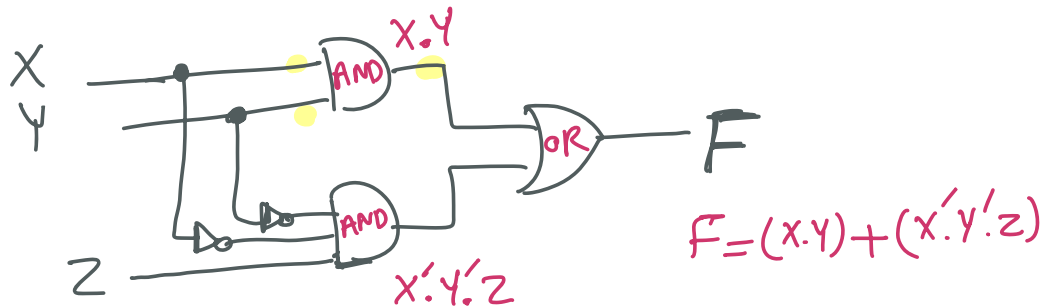
X	Y	Z
0	0	1
0	1	0
1	0	0
1	1	0

Logic Circuits

Combinational Circuits
(truth table)

Sequential Circuits
(state table)

Example of a logic Circuit (Combinational):



IC (Integrated Circuit): one or more gates
fabricated on a single
chip

SSI: Small Scale integration

MSI: Medium Scale integration

(20-200) gates

decoders, registers, Counters ...

LSI: Large scale integration

~1000 gates → memory

VLSI: Very large Scale integration

