

0010

CPE 100

Digital Logic

1101

2/3/2021

DESIGN

1101
1110

→ -2

Lecture 5

3 →

0011 →

two's complement +3

-5 →

0101
1010

invert

11
0011

1011

1110

→ -2

0001
1001

1011 → two's
Give -5

$00000 \rightarrow 0 \rightarrow -16 \rightarrow 1$
 $00000 \rightarrow 15$
 $00000 \rightarrow 16 \rightarrow 0$
 $00000 \rightarrow 31 \rightarrow 15$
 $00000 \rightarrow -16$
 $00000 \rightarrow -1$
 $00000 \rightarrow 0$
 $00000 \rightarrow +1$
 $00000 \rightarrow 15$

11
 $0011 \leftarrow 3$
 $1011 \leftarrow -5$

 1110

$1111 \rightarrow 15$
 $1110 \rightarrow 14$
 $1101 \rightarrow 13 \rightarrow 0101 + 5$
 $1100 \rightarrow 12$
 $1011 \rightarrow 11$
 $1010 \rightarrow 10$
 $1001 \rightarrow 9 \rightarrow 0011$
 $1000 \rightarrow 8 \rightarrow 0010$
 $0111 \rightarrow 7 \rightarrow 0001$
 $0110 \rightarrow 6 \rightarrow 0000 \rightarrow 0$
 $0101 \rightarrow 5 \rightarrow 0010 \rightarrow 2$
 $0100 \rightarrow 4 \rightarrow 0001 \rightarrow 1$
 $0011 \rightarrow 3 \rightarrow 0000 \rightarrow 0$
 $1101 \rightarrow -3$

2)

1
2
4
8
16
32
64
128

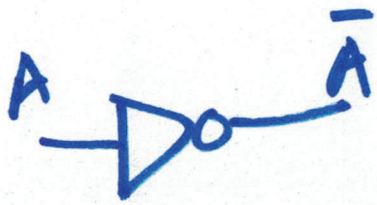
$$\begin{array}{r} 101 \\ -67 \\ \hline 4 \end{array}$$

$$\begin{array}{r} 101 \\ 64 \\ \hline 47 \\ 32 \\ \hline 15 \end{array}$$

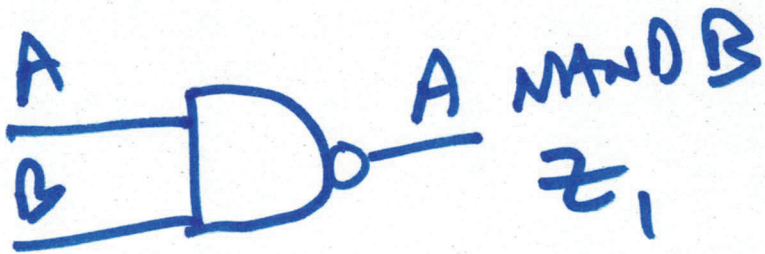
$$\begin{array}{r} 0110 \quad 1111 \quad (111) \\ 0100 \quad 0011 \quad (67) \\ \hline 1011 \quad 1100 \\ \hline 1011 \quad 1101 \quad (-67) \\ 1111 \quad 1111 \quad (111) \\ 0110 \quad 1101 \quad (-67) \\ \hline 0010 \quad 1100 \\ 32 \quad 84 \end{array}$$

44

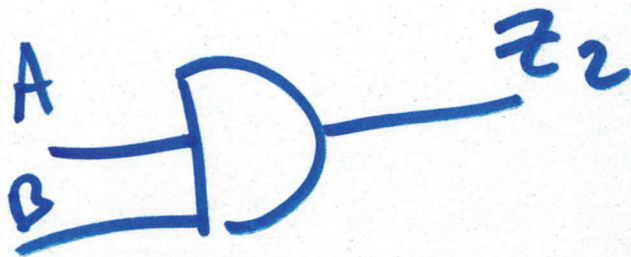
3)



A	\bar{A}
0	1
1	0

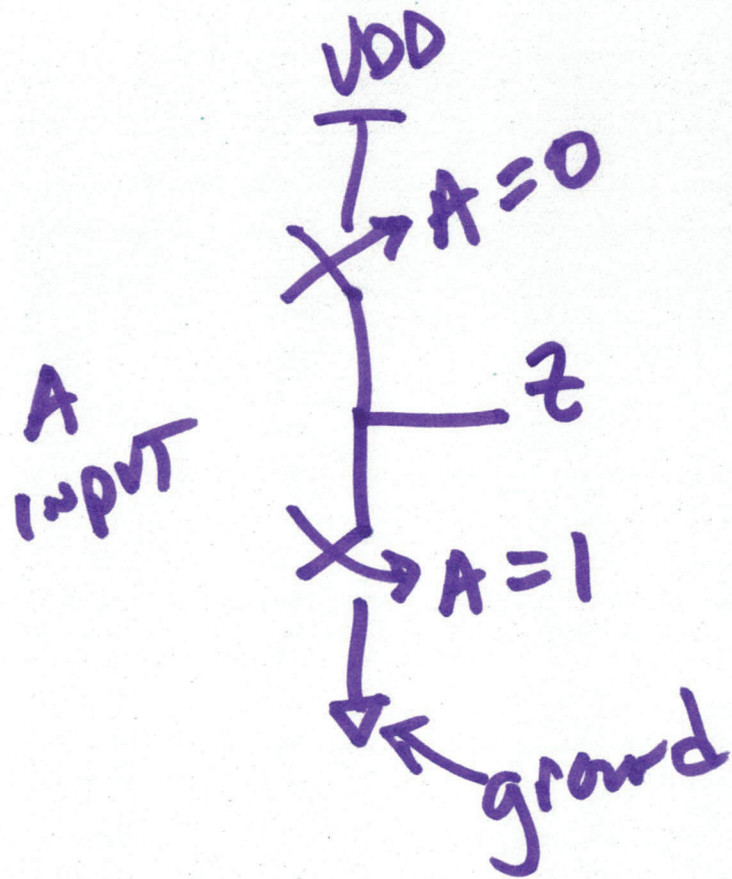


A	B	z_1
0	0	1
0	1	1
1	0	1
1	1	0

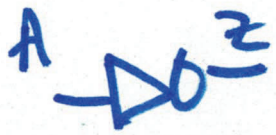


A	B	z_2
0	0	0
0	1	0
1	0	0
1	1	1

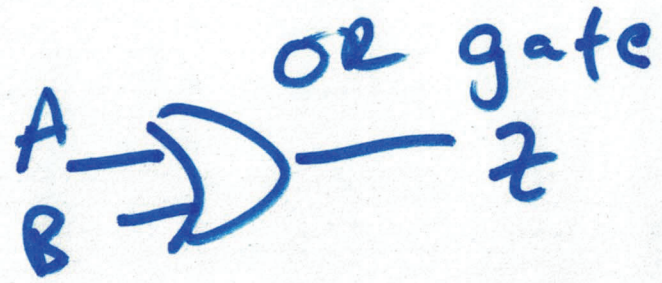
4)



5)



A	B	Z
0	0	0
0	1	1
1	0	1
1	1	1

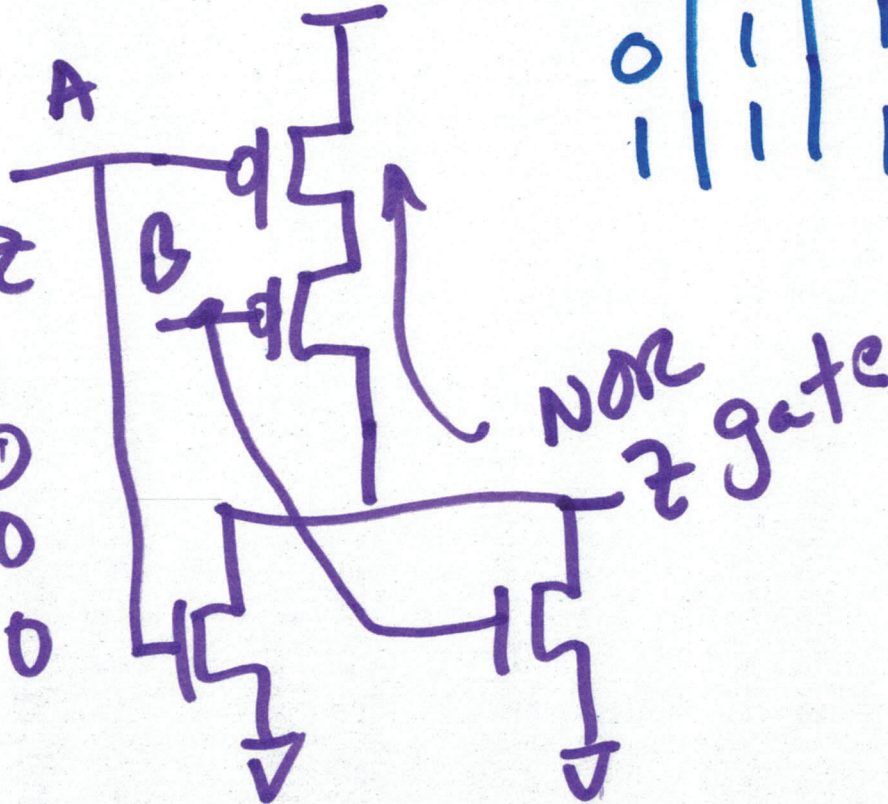


A	B	Z
0	0	0
0	1	0
1	0	0
1	1	1

A	B	Z
0	0	1
0	1	1
1	0	1
1	1	0



A	B	Z
0	0	0
0	1	1
1	0	1
1	1	0



Exclusive OR \oplus (XOR)

