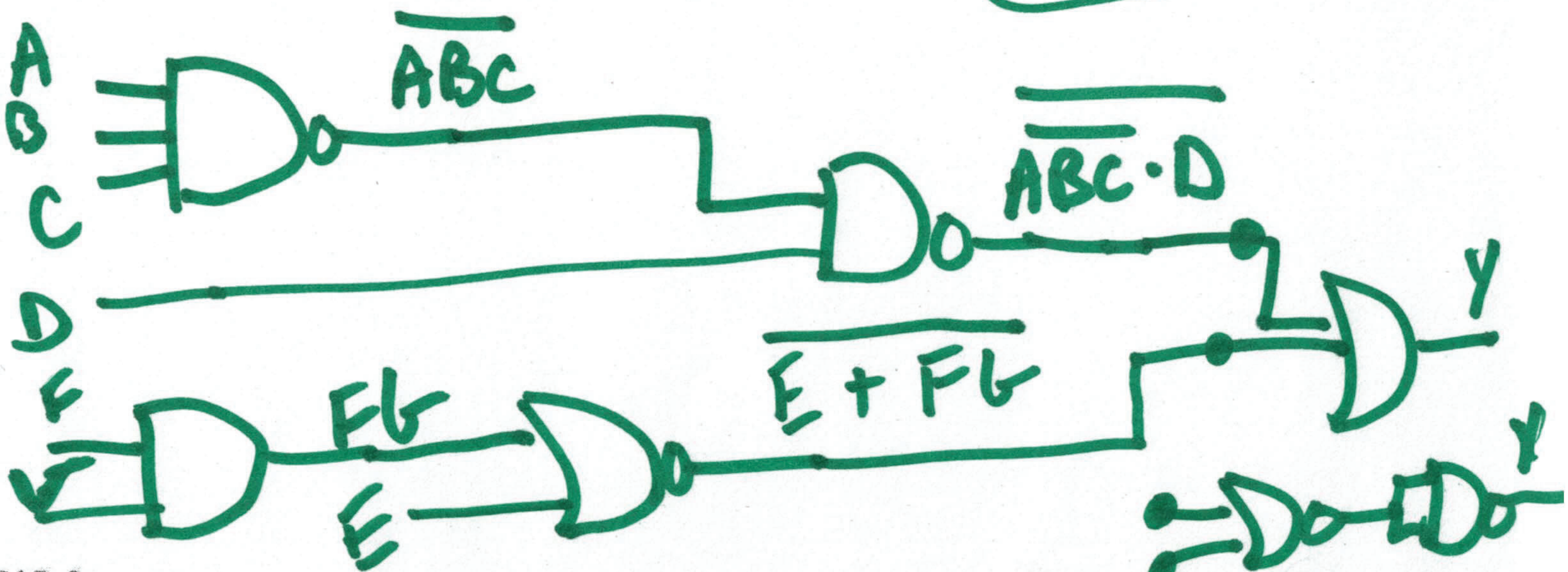
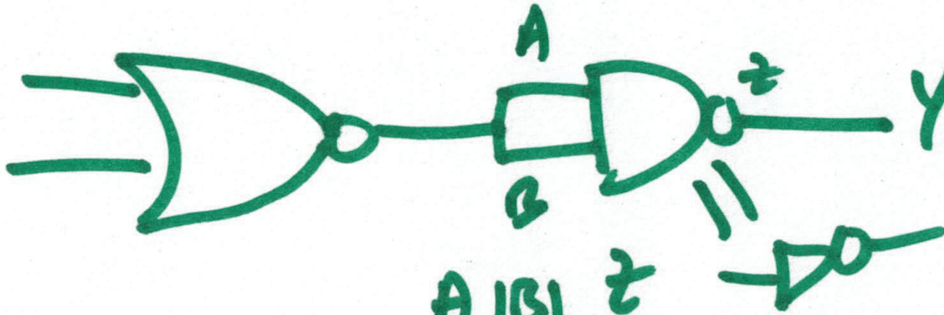
CpE 100 Digital Logic Design

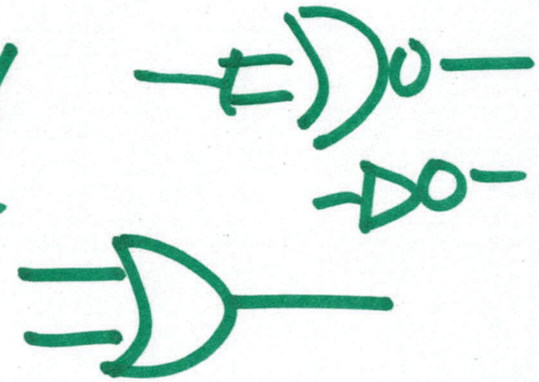
March 8, 2021

Lecture 13

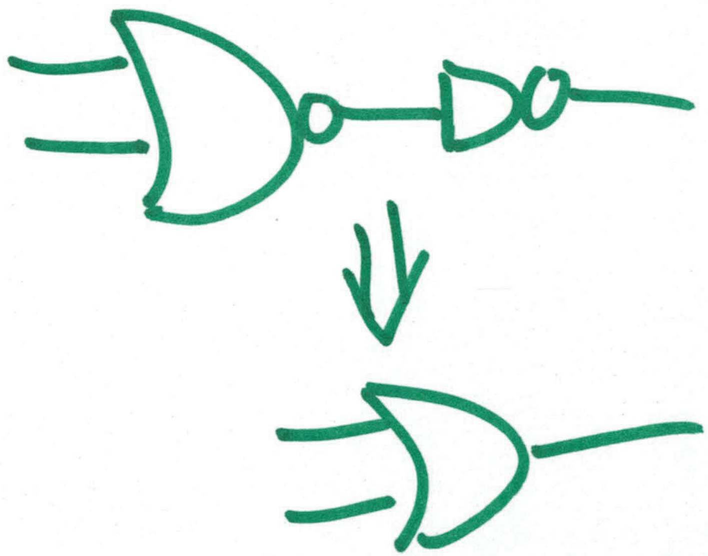
$$Y = \overline{\overline{ABC} \cdot D} + \overline{E + FG}$$







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



64 32 16 8 4 2 1

55
32

23
16

7

6-bits

$\boxed{110111}$

1110 0011
128 64 32   2 1

$\boxed{227}$

128
64

192
32

224
3

A9CD

13×16^0

12×16^1

9×16^2

10×16^3

13
192
2304
40960

A9CD

1101

1100

1001

1010

$\boxed{1010\ 1001\ 1100\ 1101}$

$\boxed{124715_8}$

$\boxed{43,469}$

$2^{32}-1$

-55

011 0111

100 1000

$+1$

$\boxed{100\ 1001}$

~~Right~~

0
7

2^3

2^3-1

111

011 0111

100 1000

1

100 1001

7-bits

~~wrong~~

right

5)

$$\begin{array}{r} 15 \\ -9 \\ \hline \end{array}$$

1111

1 1 1 1 1

$$\begin{array}{r} \\ \hline \phi \end{array}$$

$$\begin{array}{r} 9 \\ -15 \\ \hline -6 \end{array}$$

$$\begin{array}{r} 01001 \\ +10001 \\ \hline 11010 \end{array}$$

$$\begin{array}{r} 00110 \\ 11001 \\ +1 \\ \hline 11010 \end{array}$$ YAY

$$\begin{array}{r} 01111 \\ 10000 \\ 1 \\ \hline 10001 \end{array}$$ $\rightarrow -15$

$325 + 42 = 411$

$\cancel{5 \times F^3 + 2 \times F^2 + 25 \times F}$

$$3 \times F^2 + 2 \times F^1 + 5 \times F^0$$

$$+ 4 \times F^1 + 2 \times F^0$$

$$= 4 \times F^2 + 1 \times F^1 + 1 \times F^0$$

$$3 \times F^2 + 6 \times F + 7 =$$

$$4 \times F^2 + F + 1$$

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$$3F^2 + 6F + 7 = 4F^2 + F + 1$$

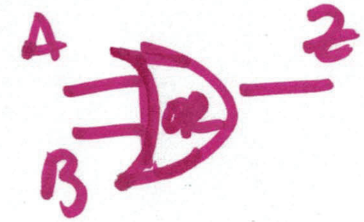
$$0 = F^2 - 5F - 6$$

$$0 = (F-6)(F+1)$$

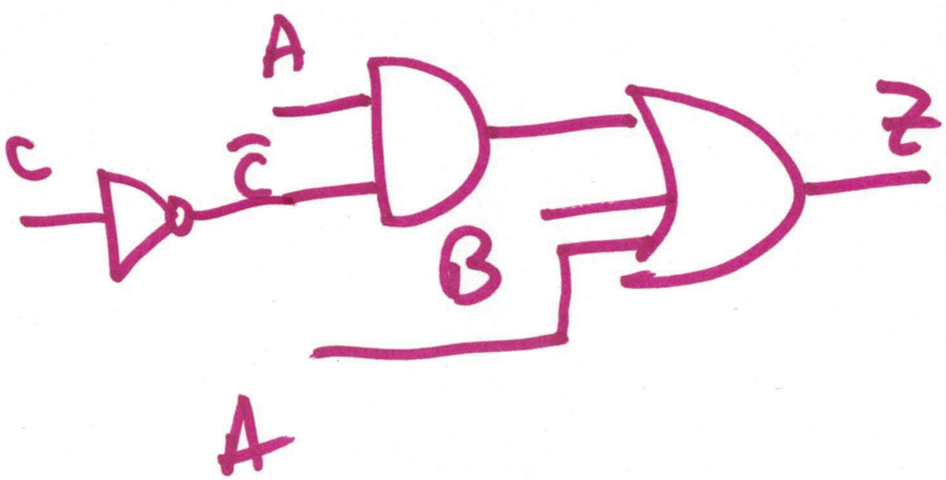
$$\boxed{F = 6}$$

8)

$$A\bar{C} + B + A \rightarrow A + B$$



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



$$Y = AC + \bar{A}\bar{B}C$$

$$= C(A + \bar{A}\bar{B})$$

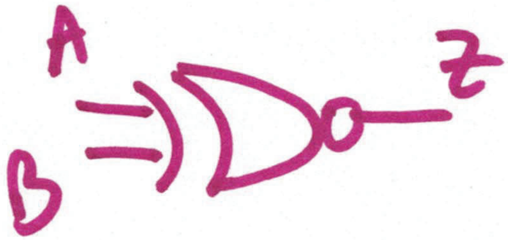
$$= C(A + \bar{B}) \rightarrow CA + C\bar{B}$$

$$\parallel ?$$

$$AC + C\bar{B}$$

yes!

B \ AC	00	01	11	10
0	0	1	1	0
1	0	0	1	0



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

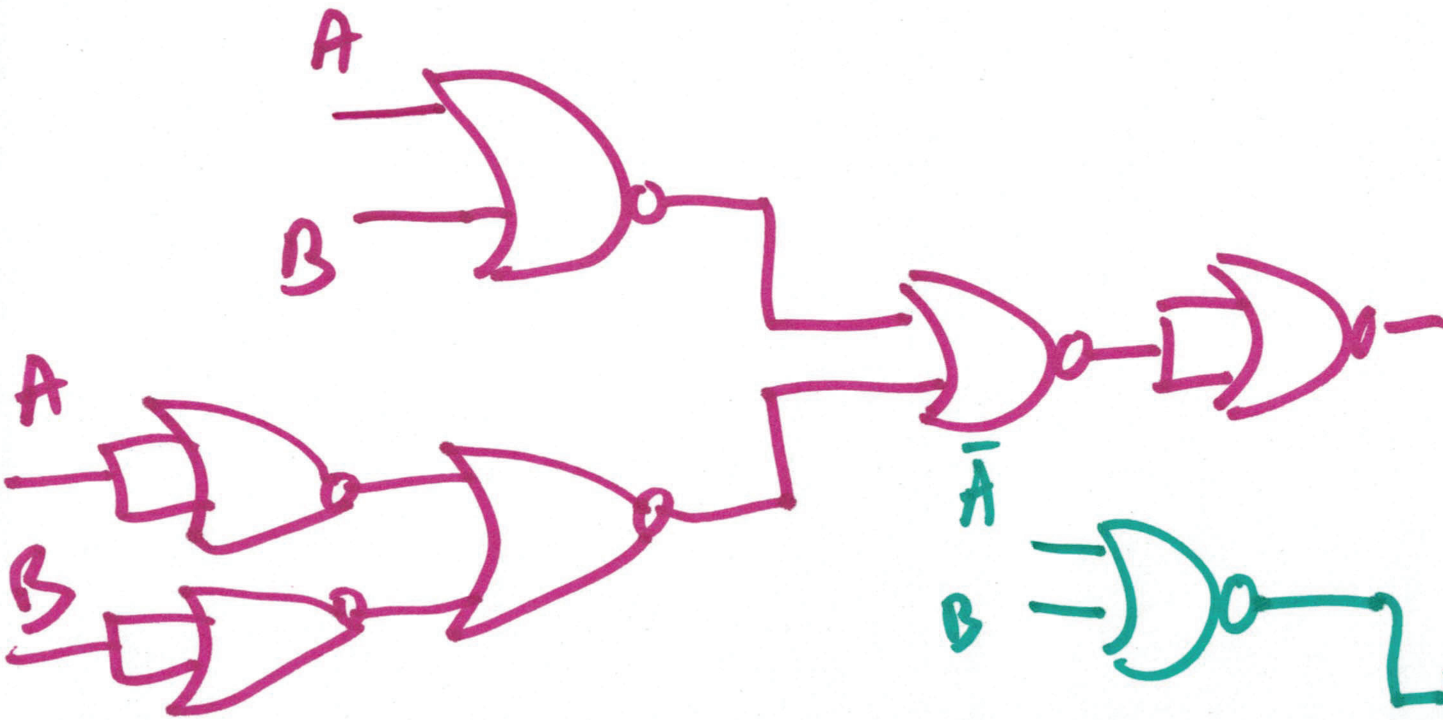
$$\bar{A}\bar{B} + AB$$

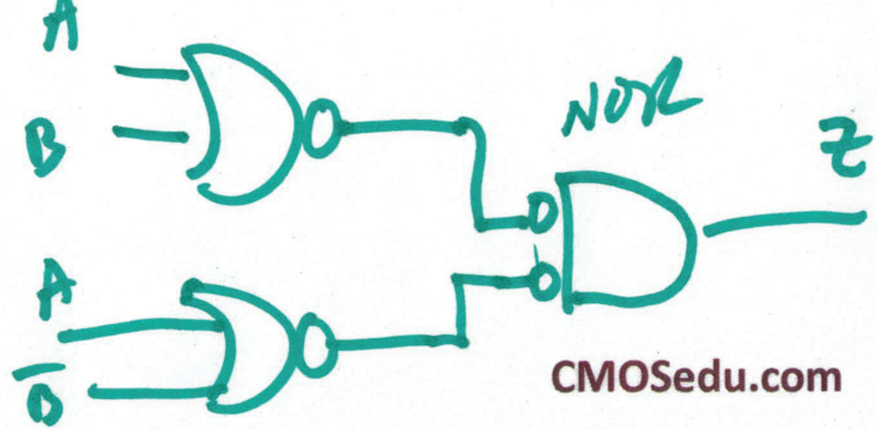
No bar

$$(\bar{A} + B)\cdot(A + \bar{B})$$

$$\overline{A+B} = \bar{A}\,\bar{B}$$

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

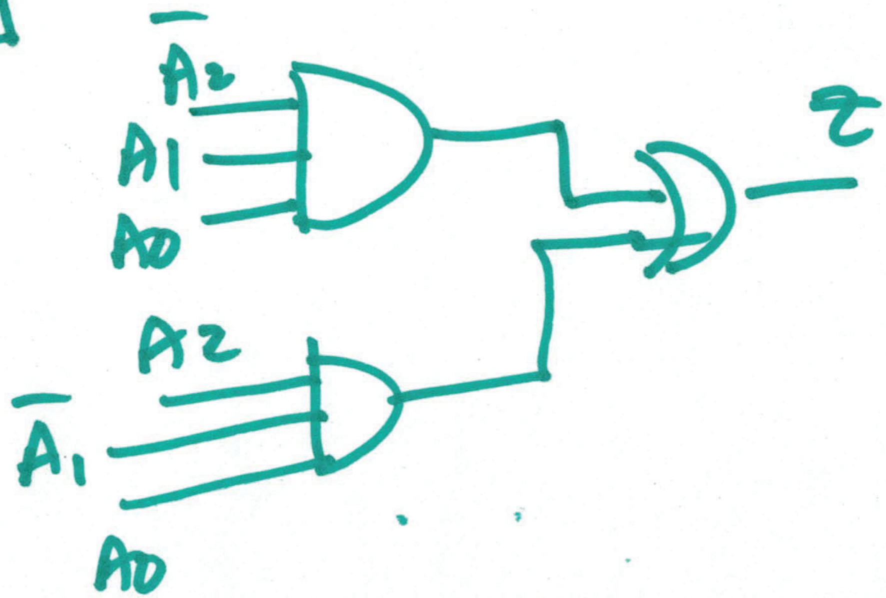




	A_2	A_1	A_0	
Tuesday →	0	1	1	(3)
Thursday →	1	0	1	(5)

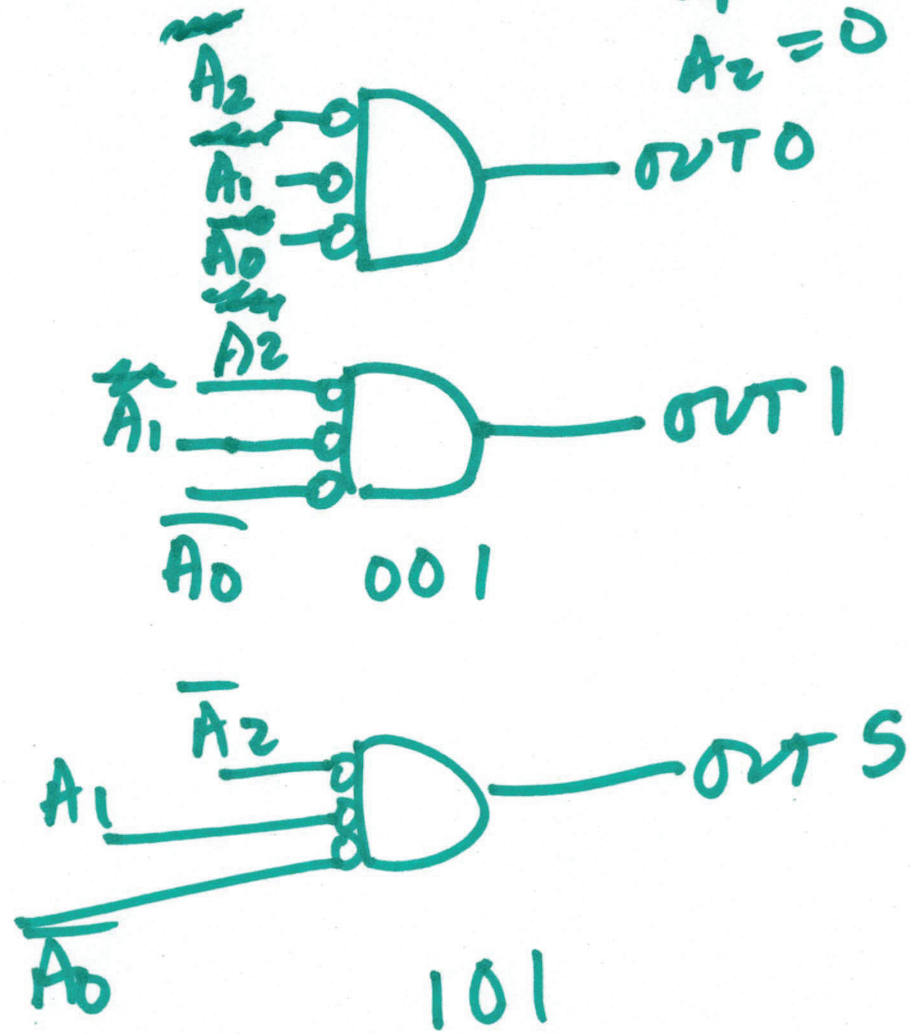
A_0 \ A_2A_1	00	01	11	10
0	X			
1		1		1

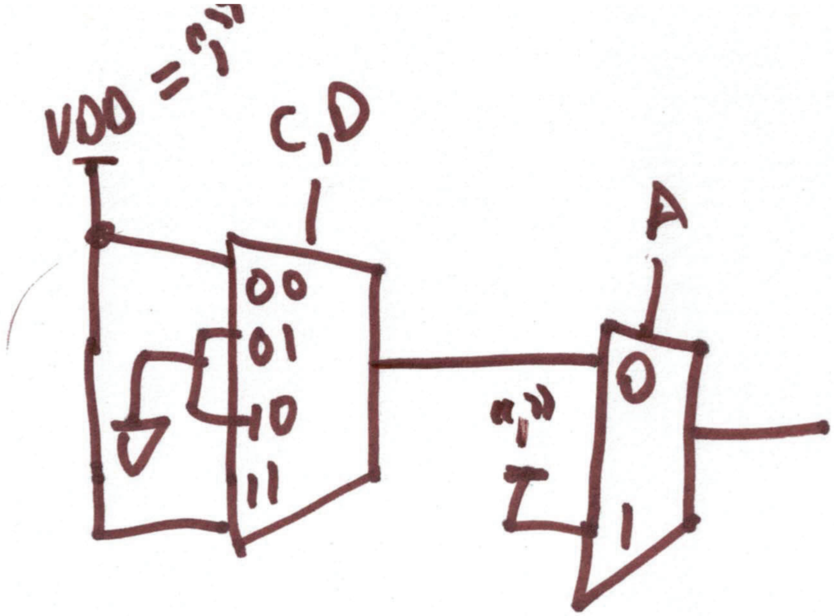
$$Z = \bar{A}_2 \cdot A_1 \cdot A_0 + A_2 \bar{A}_1 A_0$$



3-bit decoder

$A_0 = 0$
$A_1 = 0$
$A_2 = 0$





$$z = \cancel{x + y}\, x$$

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

$$y = A + \bar{A}(\bar{C}\bar{D} + CD)$$

$$y = A + \bar{C}\bar{D} + CD$$

D \ AC	00	01	11	10
0	1	0	1	1
1	0	1	1	1