Don Small

2/16/22 Bonus Activity

1) a) $B + \bar{A}B = A \Rightarrow \bar{A} + \bar{B} = \bar{A}$ (T)

b) (T)

c) (F)

d) (F)

e) (F)

f) (T)

g) (T)

h) (F)

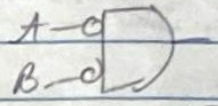
i) (F)

j) (F)

$\overline{\bar{I} \cdot \bar{B}}$

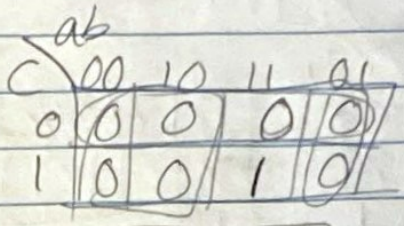
$\bar{B} + \bar{\bar{A}} = A + B$

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



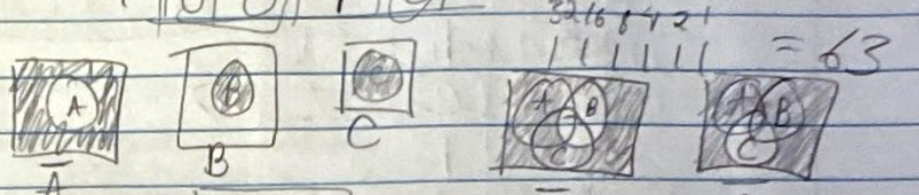
$(2 \cdot 3 + 2 \cdot 1) + 6 - 13$

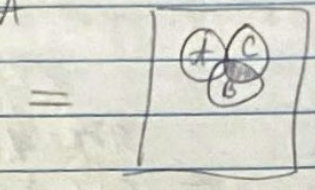
$8 + 8 = 16 - 13 = 3$

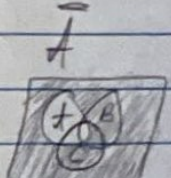


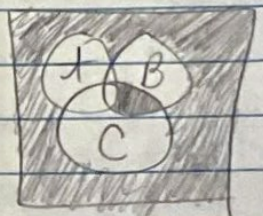
$\Rightarrow c \cdot b \cdot a + \bar{b}$

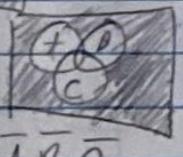
2)







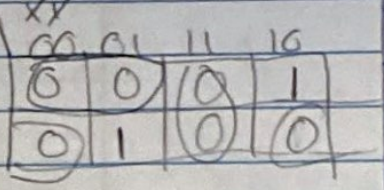




3) a)

x	y	z	$x \oplus y$	$x \oplus z$
0	0	0	0	0
0	0	1	0	1
0	1	0	1	0
0	1	1	1	1
1	0	0	1	1
1	0	1	1	0
1	1	0	1	0
1	1	1	0	1

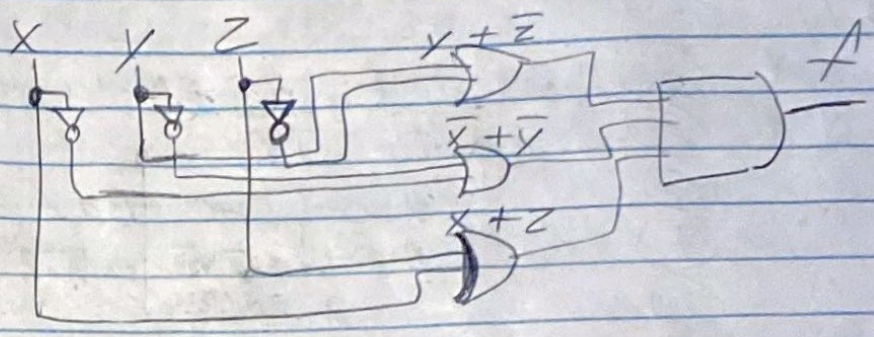
b)



$\Rightarrow y + \bar{z} \cdot \bar{x} + \bar{y} \cdot x + z$

$y + \bar{z} \cdot \bar{x} + \bar{y} \cdot x + z$

c)



4) a) $2 \cdot 6^2 + 5 \cdot 6^1 + 2 \cdot 6^0$

$\Rightarrow 72 + 30 + 2 = 104$

Q	R
104	0
52	0
26	0
13	1
6	0
3	1
1	1
0	

$\Rightarrow 96 + 8 = 104$

64 32 16 8 4 2 1

$\Rightarrow$ 1101000

b)

Q	R
684	0
342	0
171	1
85	1
42	0
21	1
10	0
5	1
2	0
1	1
0	

$640 + 32 + 12 = 684$

512 256 128 64 32 16 8 4 2 1

$\Rightarrow$ 1010101100

$16 \cdot 16 = 256 \cdot 16$

$2560 + 1536 \Rightarrow$

$4,096 \cdot 10 = 40,960$

c) 3 2 1 0

A ADF

$10 \cdot 16^3 + 10 \cdot 16^2 + 13 \cdot 16 + 15$

$40,960 + 2560 + 208 + 13 \Rightarrow$

40960

2560

$+ \quad 223$

43743

* did all this w/out calculator, but getting this into octal w/out a calculator would be horrible

Q	R
43743	7
5467	3
683	3
85	5
10	2
1	1

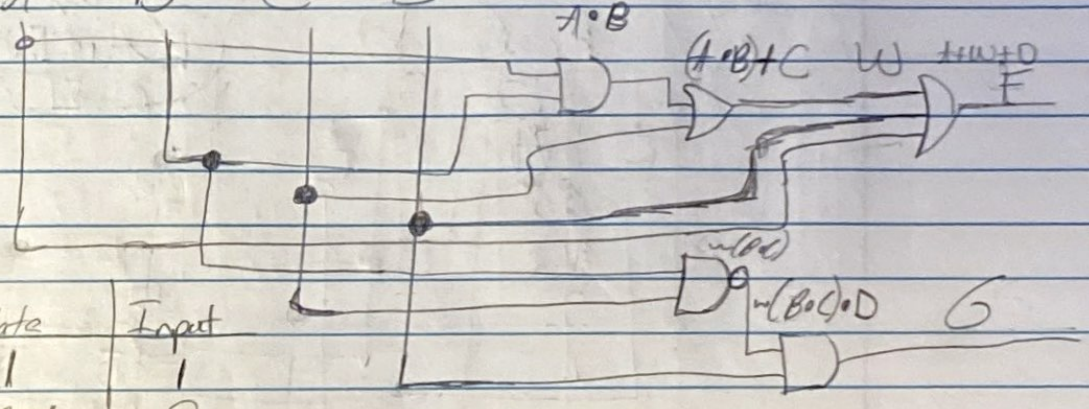
$\Rightarrow 125337_8$

d) 256 128 64 32 16 8 4 2 1

$100011001 \Rightarrow 256 + 16 + 8 + 1$

$= 281_{10}$

5) A B C D



b)

Gate	Input
B & C : 1	1
A·B : 1	2
(A·B)+C 1	3
F 1	3
B·C : 1	2
B·C·D 1	2

$= 6 + 13 = 19$

6) a) $A(x,y) = x\bar{y} \cdot \overline{\bar{y} \cdot \overline{\bar{x}+y}}$

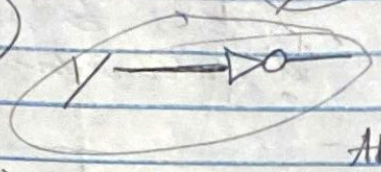
b) $\Rightarrow x \cdot \overline{(\bar{y} \cdot \bar{y})} \cdot \overline{\bar{x}+y}$

$\Rightarrow x \cdot \overline{\bar{y}+y}$

$\Rightarrow x \cdot \bar{\bar{y}} \cdot \bar{y}$

$\Rightarrow x \cdot x \cdot \bar{y}$

$\Rightarrow \bar{y}$

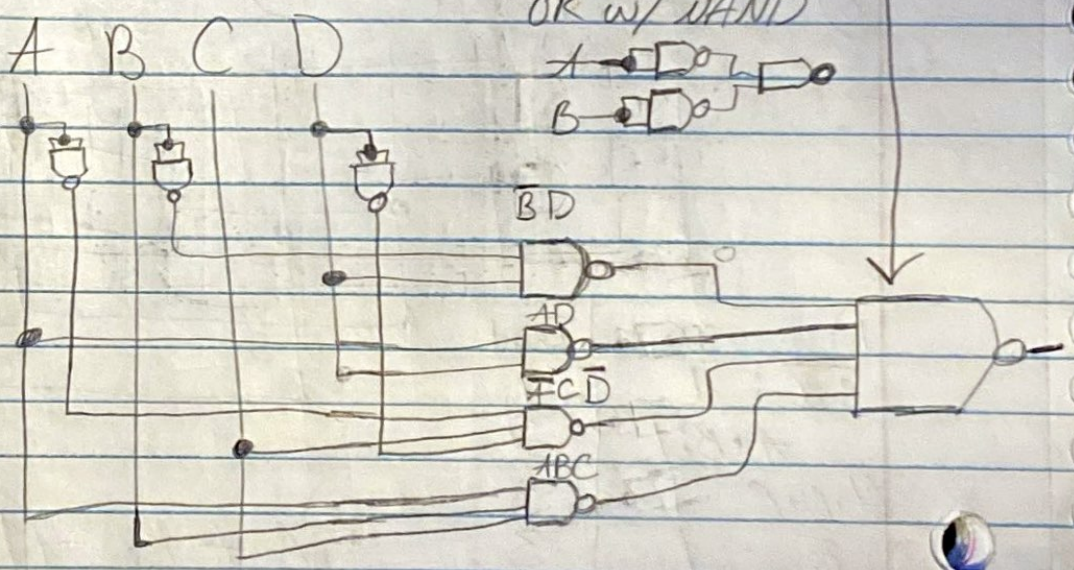
c) 

7) a)

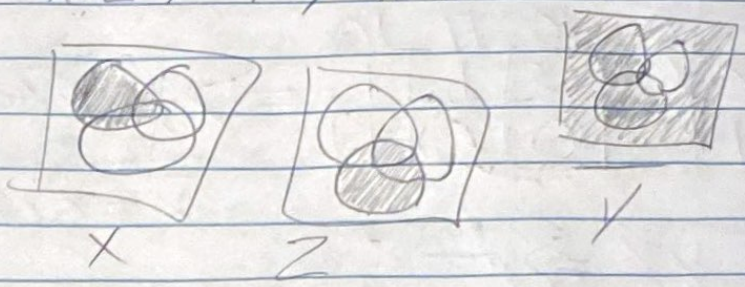
$\bar{A}BD$	$\bar{A}C\bar{D}$	$\bar{A}\bar{B}D$	$A\bar{B}D$	$BC\bar{D}$
11-1	0-10	00-1	10-1	-110

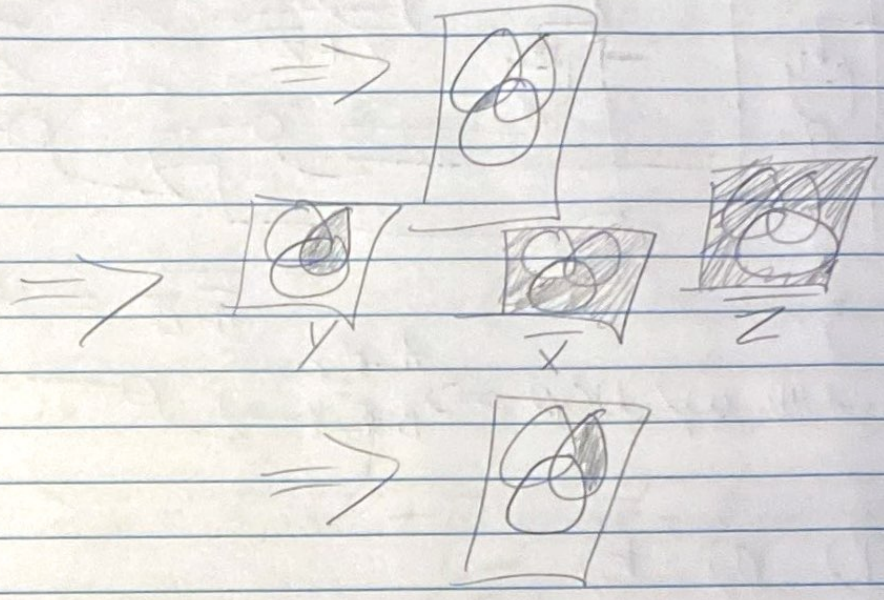
CD \ AB	00	01	11	10
00	0	0	0	0
01	1	0	1	1
11	1	0	1	1
10	1	1	1	0

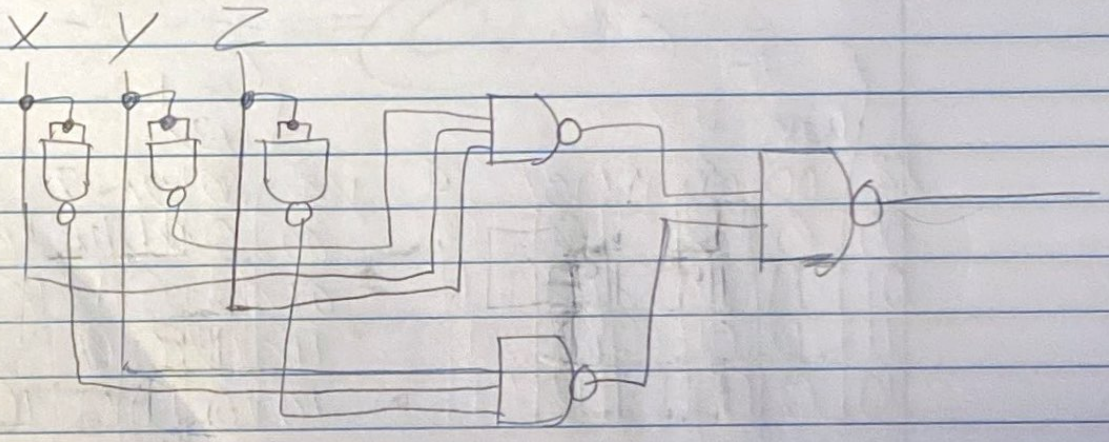
b) $\Rightarrow \bar{B}D + AD + \bar{A}C\bar{D} + ABC$

c) 

8) a) $X \cdot Z \cdot \bar{Y} + Y \cdot \bar{X} \cdot \bar{Z}$





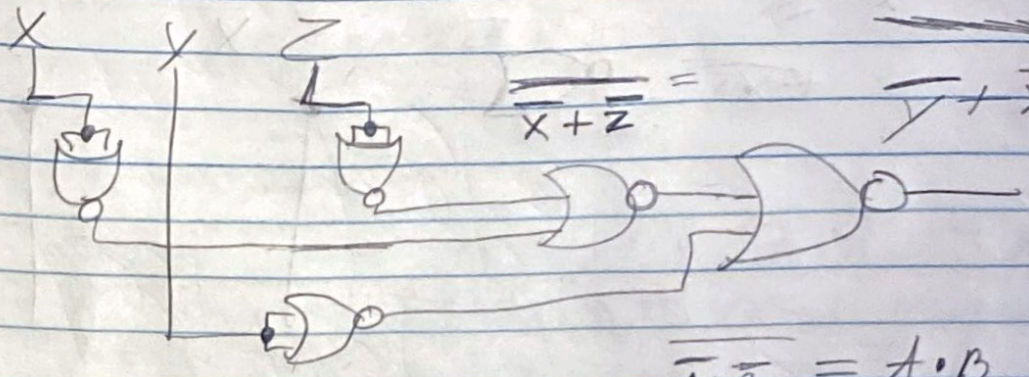


b)

z \ xy	00	10	11	10
0	0	0	1	1
1	0	0	0	1

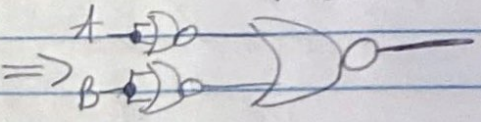
$\Rightarrow y \cdot \overline{x+z}$

$\overline{y + x \cdot z} \Rightarrow y \cdot \overline{x} + \overline{z}$



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

AND w/ NOR $\Rightarrow$



a) a) b)

F

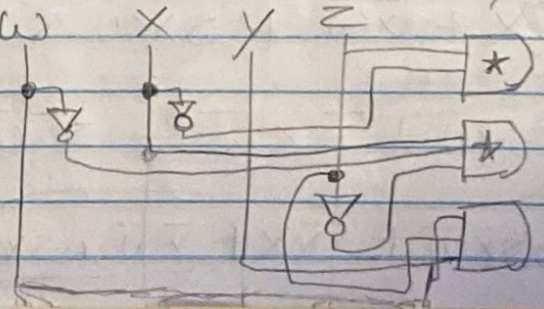
yz \ wx	00	01	11	10
00	0	1	0	0
01	1	d	0	1
11	1	0	0	d
10	0	d	0	1

G

yz \ wx	00	01	11	10
00	0	1	d	d
01	d	0	0	1
11	1	0	1	1
10	0	1	d	0

$\Rightarrow \overline{x}z + \overline{w}x\overline{z} + wyz$

c)



10) $\overline{xy}(\bar{z} + (z(\overline{w+w}) + \overline{(y+z)} \cdot (y+yz) \cdot (wx)$
$+ wxy + yxz \cdot \overline{(z+\bar{z}y)}$

$\Rightarrow \bar{x} + \bar{y}(\bar{z} + (z(\bar{w}\bar{w}))) + (\bar{y}\bar{z}) + (\bar{y} \cdot \bar{y}\bar{z}) + (\bar{w} + \bar{x})$
$+ wxy + yxz \cdot (\bar{z} \cdot \bar{z}y)$

$\Rightarrow \bar{x} + \bar{y} + (\bar{y} \cdot \bar{z}) + (\bar{y}\bar{y}\bar{z}) + (\bar{w} + \bar{x}) + wxy + yxz \cdot y$

$\Rightarrow \bar{x} + \bar{y} + \bar{y}\bar{z} + (\bar{y} \cdot \bar{y} + \bar{z}) + (\bar{w} + \bar{x}) + wxy + yxz \cdot y$

$\Rightarrow \bar{x} + \bar{y} + \bar{y}\bar{z} + \bar{z} + (\bar{w} + \bar{x}) + wxy + yxz \cdot y$

$\Rightarrow \bar{x} + \bar{y} + \bar{z} + \bar{w} + \bar{x} + wxy + yxz \cdot y$

$\Rightarrow \bar{y} + \bar{z} + \bar{w} + \bar{w} + \bar{x} + \bar{y} + \bar{z} + \bar{y} + \bar{z} \cdot y$

$\Rightarrow \bar{y} \cdot y = 0$