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HW 4   #4,7,11,15,20,21,23,29,34,45

4. $A_0=1, B_0=1, C_{in_0}=0, \Sigma_0=0, C_{out_0}=1$ 1 1 1

$A_1=1, B_1=0, C_{in_1}=1, \Sigma_1=0, C_{out_1}=1$ $+1011$

$A_2=1, B_2=1, C_{in_2}=1, \Sigma_2=1, C_{out_2}=1$ $\overline{}$
                                                                      1100

$\Sigma_3=1$ $\boxed{\Sigma_T = 1100}$

7. $\widehat{Add/Subt.}$

$A=1001$ $A_0=1$, $C_{in_0}=1$, $B_0=1, \Sigma_0=1, C_{out_0}=1$

$B=1100$ $A_1=0$, $C_{in_1}=1$, $B_1=1, \Sigma_1=0, C_{out_1}=1$

$\overline{B}=0011$ $A_2=0$, $C_{in_2}=1$, $B_2=0, \Sigma_2=1, C_{out_2}=0$

                $A_3=1$, $C_{in_3}=0$, $B_3=0, \Sigma_3=1, C_{out_3}=0$

$\boxed{\Sigma_T = 1101}$
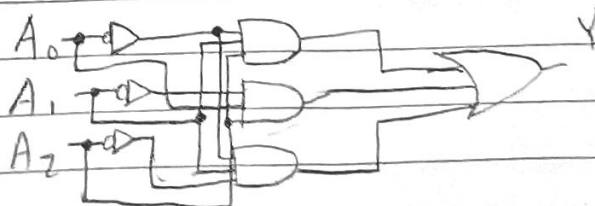

11. $6(C_{in} \text{ to } C_{out}) + (C_{in} \text{ to } \Sigma) + (A \text{ to } \Sigma \text{ and } C_{out}) \leftarrow$ same time
                                                                      as (B to Σ and C_{out})

$6(25ns) + 35ns + 40ns = \boxed{225ns}$

15. a) $A=1100$, $B=1001$ $A_3=B_3$ $A_2>B_2$ $A_1=B_1$ $A_0<B_0$

$\boxed{A>B=1}$

   b) $A>B=0$, $A=B=0$, $\boxed{A<B=1}$

   c) $A>B=0$, $\boxed{A=B=1}$, $A<B=0$

20. $A_0 = 100010$ A_0

   $A_1 = 001100$ A_1

   $A_2 = 111000$ A_2

$(\overline{A_0} A_1 A_2) + (A_0 \overline{A_1} A_2) + (A_0 A_1 \overline{A_2})$

A_0

$Y = 101100$ Y = 1 1 1 0 1 1 0 0

21.

A_0 0 0 0 0 0 0 0 0 0 0 0 0

A_1 0 0 0 1 1 0 0 1 1 0 0

A_2 0 0 1 0 1 0 1 0 1 0 0

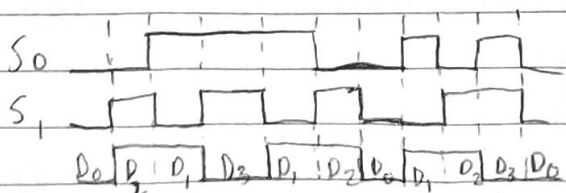A_3 0 1 0 0 0 0 1 0 0 0 0

0

1

2

3

4

5

6

7

8

9
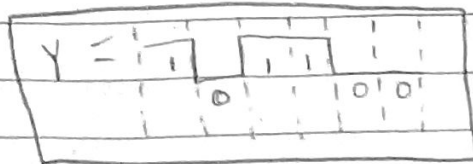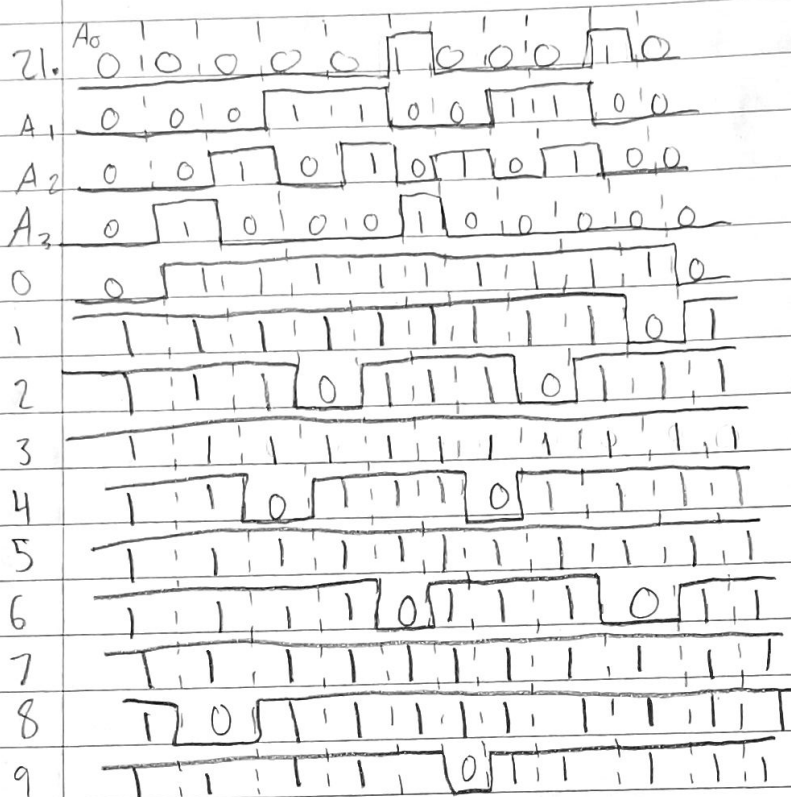
23. OUTPUT = 1011

Not valid because 1011 is not between 0000 and 1001.

29. $D_0 = 0$ $D_1 = 1$ $D_2 = 1$, $D_3 = 0$ $S_0 = 0$, $S_1 =$

S_0	S_1	
0	0	$= D_0$
0	1	$= D_1$
1	0	$= D_2$
1	1	$= D_3$

S_0

S_1

D_0 D_2 D_1 D_3 D_1 D_2 D_0 D_1 D_2 D_3 D_0

34. Σ and C_{out} not working properly.
   C_{in} is at fault.

45.

	A	B	C_{in}	C_{out}	Σ
0	0	0	0	0	0
1	0	0	1	0	1
2	0	1	0	0	1
3	0	1	1	1	0
4	1	0	0	0	1
5	1	0	1	1	0
6	1	1	0	1	0
7	1	1	1	1	1

$1, 2, 4, 7 = \Sigma$

$$\Sigma = \bar{A}\bar{B}C_{in} + \bar{A}B\bar{C}_{in} + A\bar{B}\bar{C}_{in} + ABC_{in}$$

$3, 5, 6, 7 = C_{out}$

$$C_{out} = \bar{A}BC_{in} + A\bar{B}C_{in} + AB\bar{C}_{in} + ABC_{in}$$

BC_{in}

A		00	01	11	10
	0	0	1	0	1
	1	1	0	1	0

$$\Sigma = \bar{A}\bar{B}C_{in} + \bar{A}B\bar{C}_{in} + A\bar{B}\bar{C}_{in} + ABC_{in}$$

BC_{in}

A		00	01	11	10
	0	0	0	1	0
	1	1	1	1	1

$$C_{out} = AC_{in} + BC_{in} + AB$$

A

B

Cin

— Σ

A

B

Cin

— C_{out}