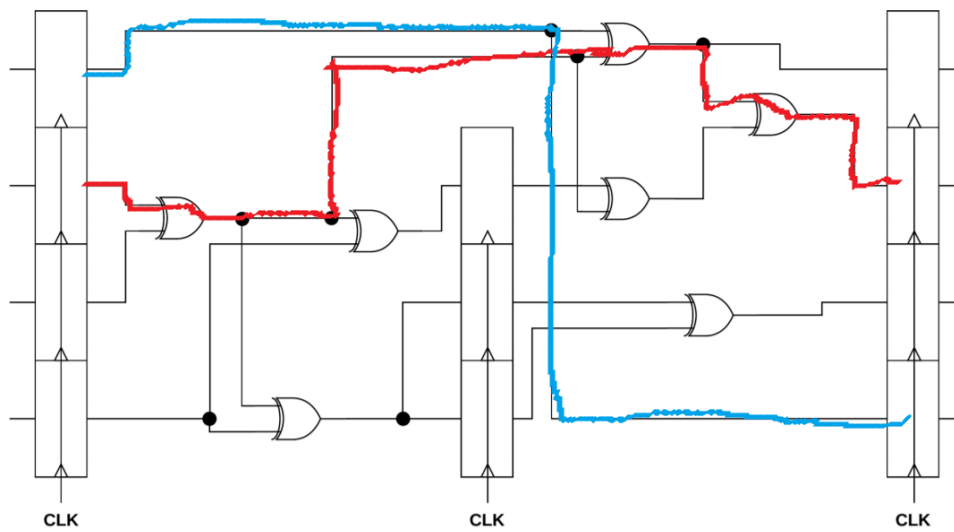


1)



a)

$$T_c \geq T_{pcq} + T_{pd}(\max) + T_{setup}$$

$$T_c \geq T_{pcq} + 3 \cdot T_{pd} + T_{setup}$$

$$T_c \geq 70 + 3 \cdot 60 + 60 = 310 \text{ ps}$$

$$\text{Max Frequency} = 1/s/T = 1/(310 \text{ ps}) = 3.226 \text{ GHz}$$

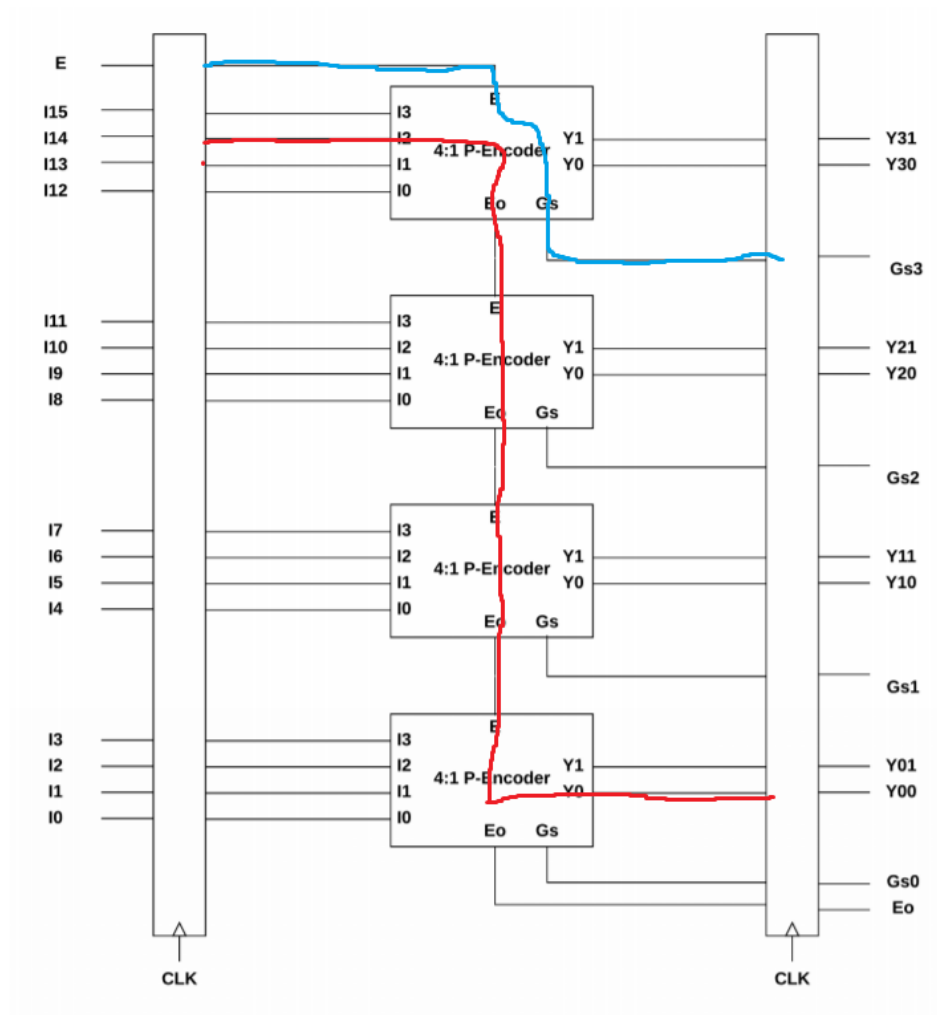
b)

$$T_{ccq} + T_{cd}(\min) \geq T_{hold} + T_{skew}$$

$$50 + 0 \cdot 40 \geq 20 + T_{skew}$$

$$T_{skew} \leq 30$$

2)



a)

$$T_c \geq T_{pcq} + T_{pd(max)} + T_{setup}$$

$$T_c \geq 35 + (30 + 20 + 20 + 25) + 30$$

$$T_c \geq 160ps$$

$$\text{Max Frequency} = 1s/T = 1/(160ps) = 6.25 \text{ GHz}$$

b)

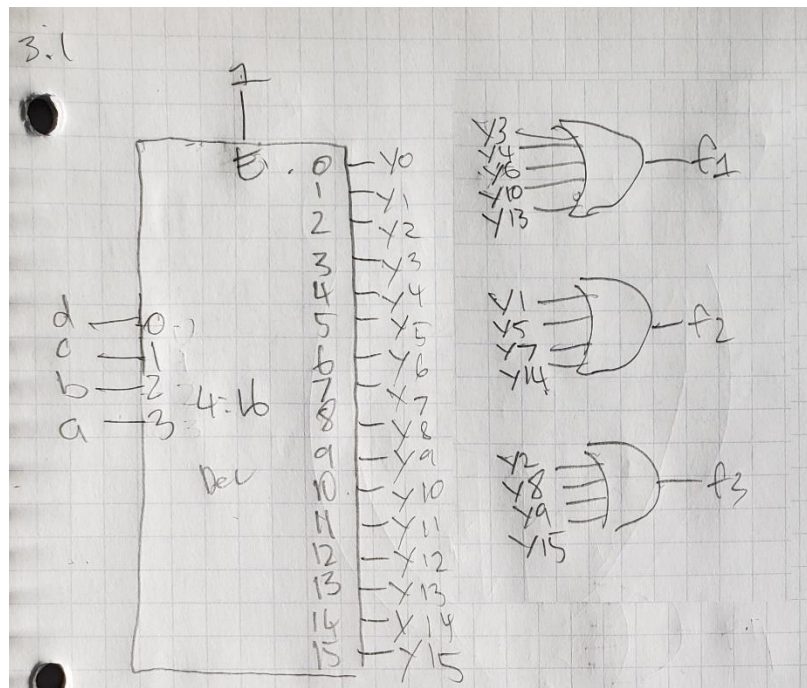
$$T_{ccq} + T_{cd(min)} \geq T_{hold} + T_{skew}$$

$$25 + (10) \geq 10 + T_{skew}$$

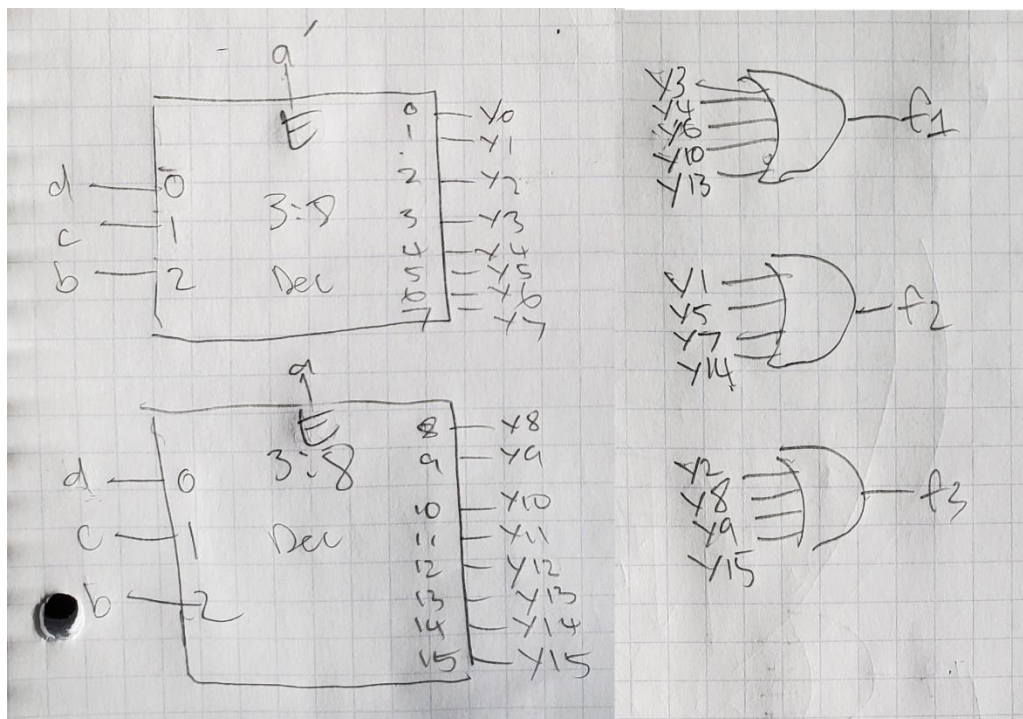
$$T_{skew} \leq 25$$

3)

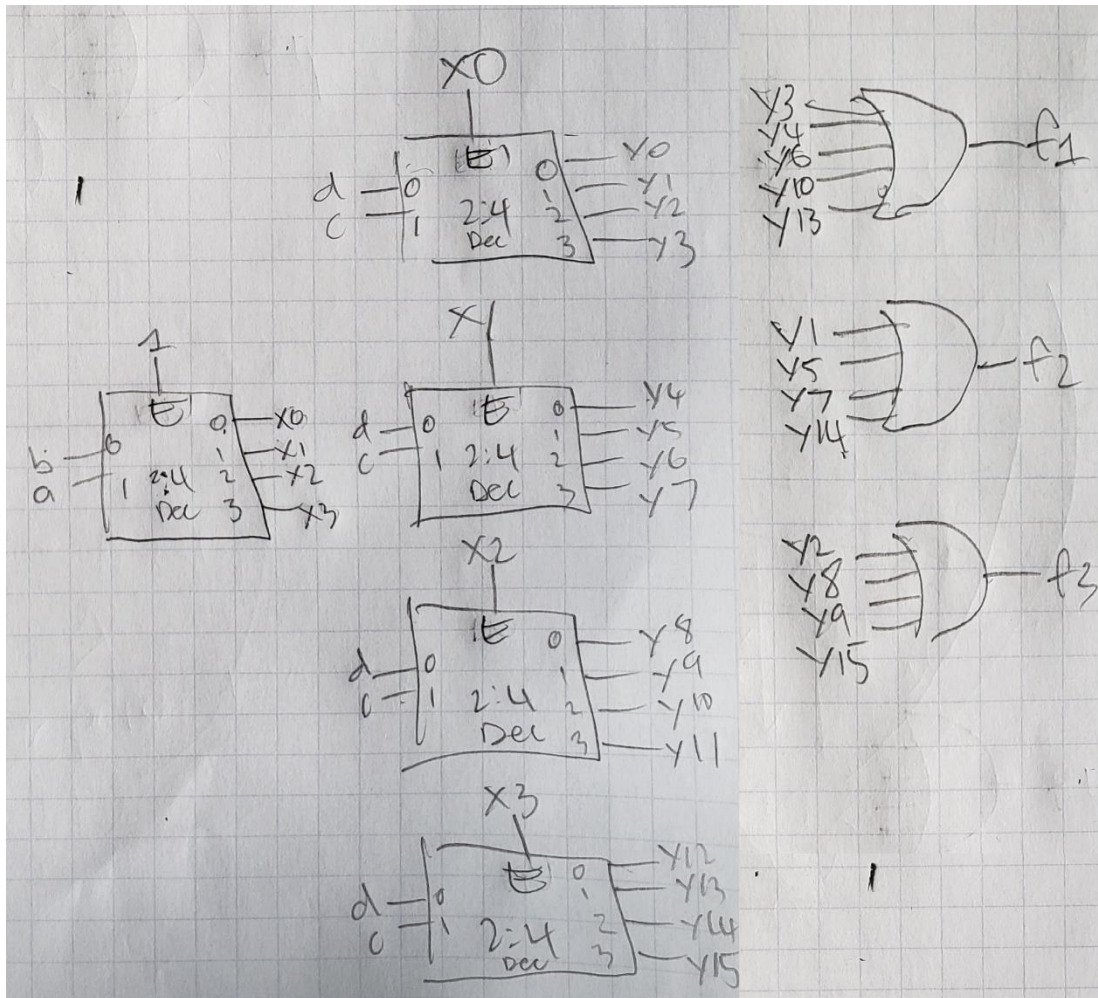
3.1)



3.2)

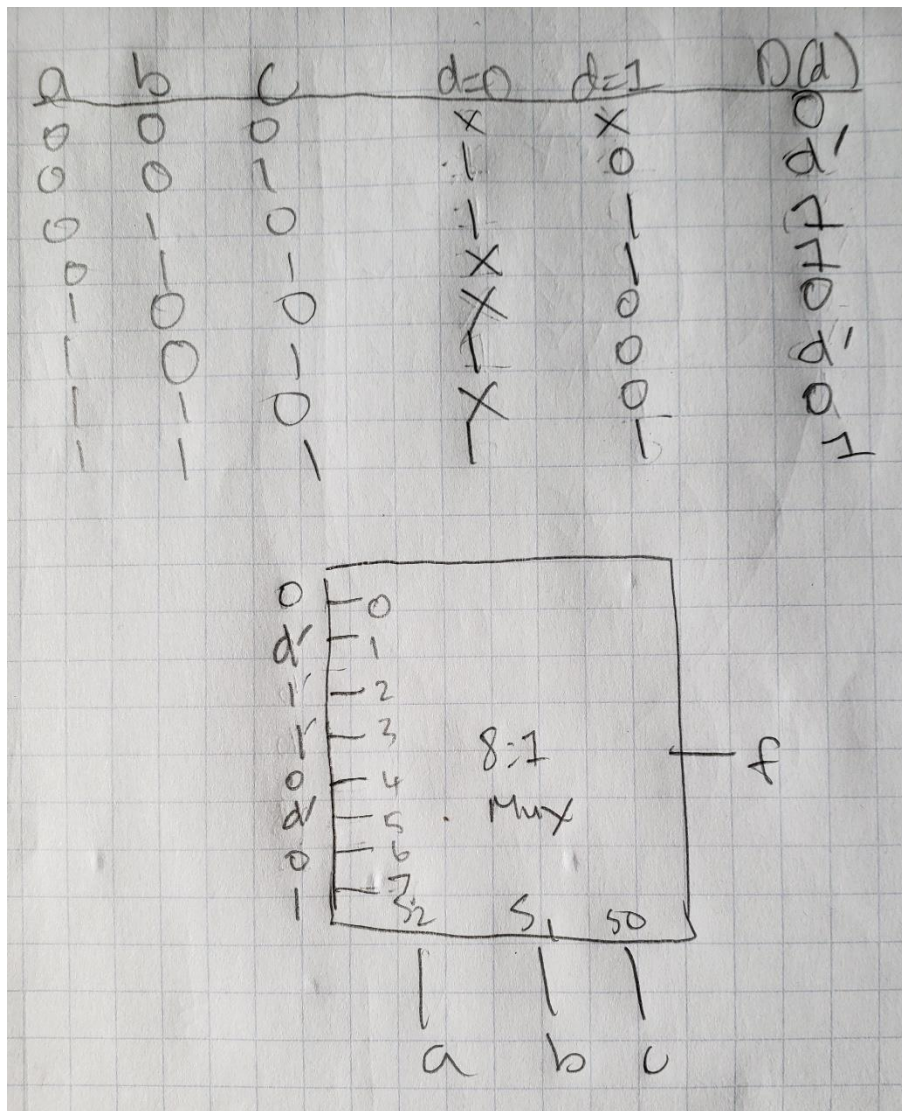


3.3)

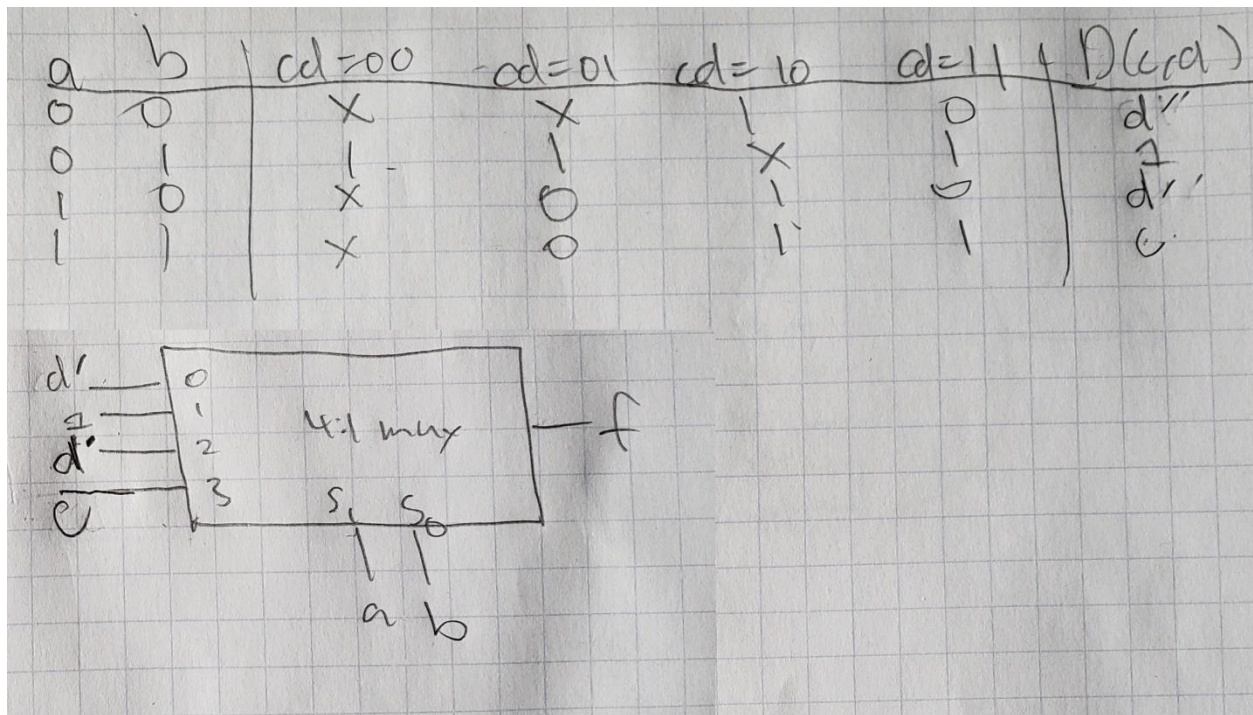


4)

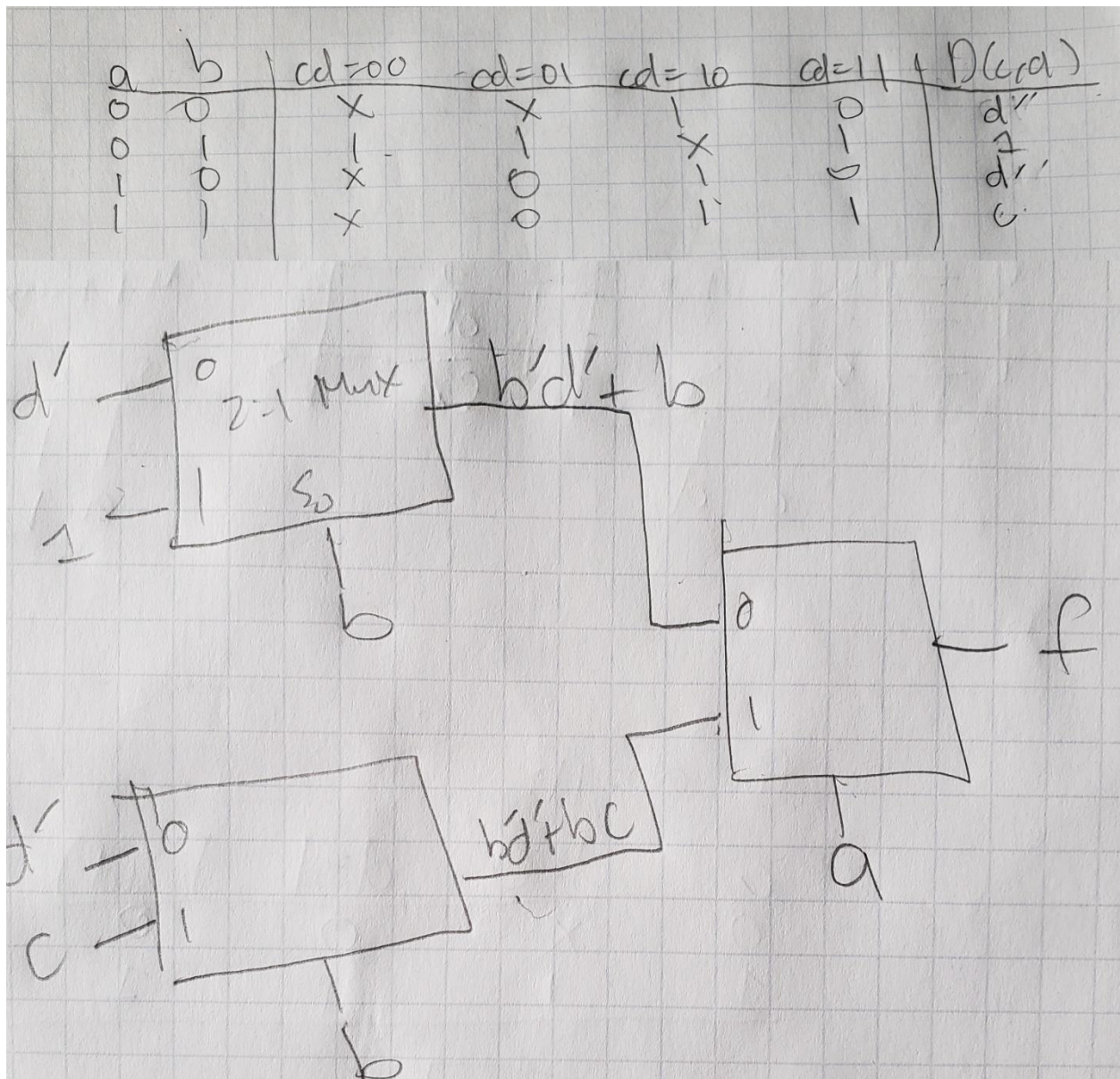
4.1)



4.2)

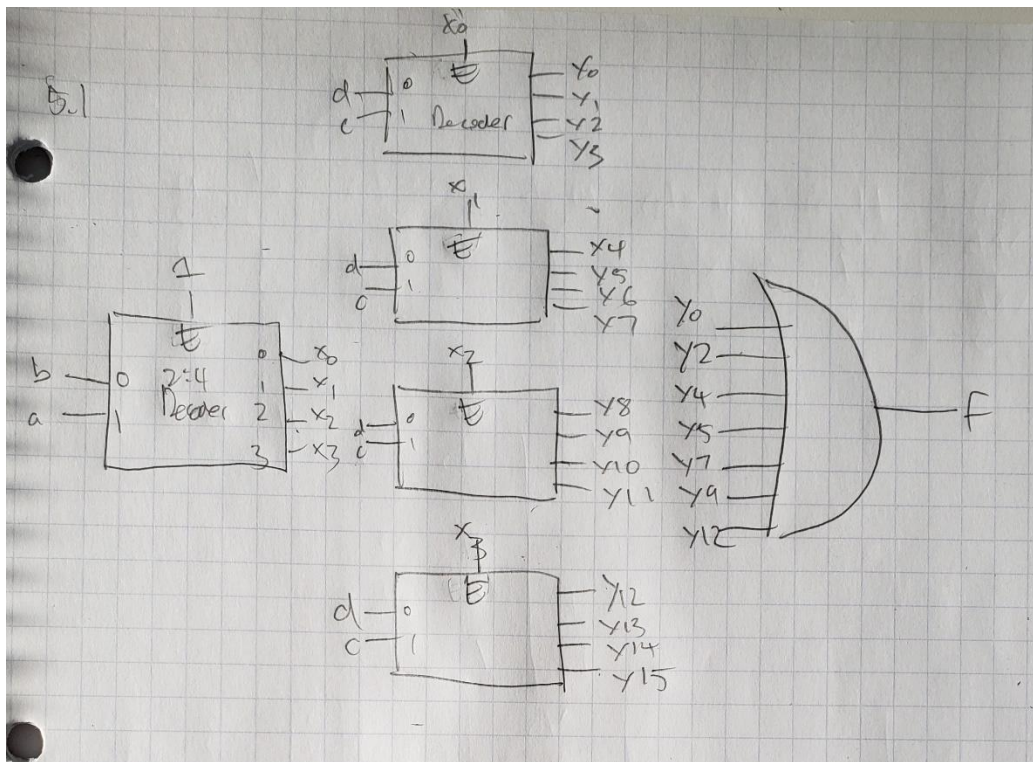


4.3)

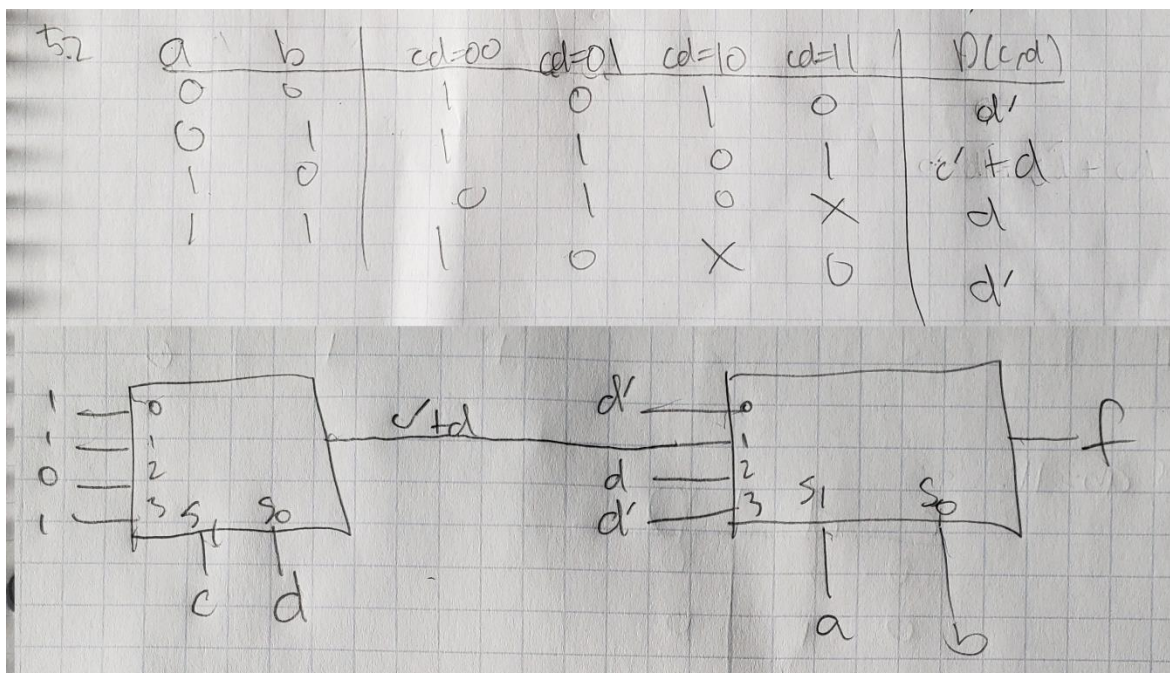


5)

5.1)



5.2)



5.3)

a	bcd								D(b,c,d)
0	000	001	010	011	100	101	110	111	D ₀
1	0	1	0	X	1	0	X	0	D ₁

D₀:

b \ cd	00	01	11	10
0	1	0	0	1
1	1	1	1	0

$$b'd' + cd' + bcd$$

D₁:

b \ cd	00	01	11	10
0	0	1	X	0
1	1	0	0	X

$$b'd + bd'$$

