

worst case delay of GT # (164, 164)

worst case delay of EQ # (132, 132)

هنگامی که با ارزش ترین بیت (سمت چپ ترین بیت) تغییری کند

4-6)

$A_i A_0$	00	01	11	10
$B_i B_0$	0	1	1	0
00	0	1	1	0
01	1	0	0	1
11	1	0	0	1
10	0	1	1	0

$C_i = 0$

$A_i A_0$	00	01	11	10
$B_i B_0$	1	0	0	1
00	1	0	0	1
01	0	1	1	0
11	0	1	1	0
10	1	0	0	1

$C_i = 1$

$$S_0 = \bar{C}_i A_0 \bar{B}_0 + \bar{C}_i \bar{A}_0 B_0 + C_i \bar{A}_0 \bar{B}_0 + C_i A_0 B_0$$

$A_i A_0$	00	01	11	10
$B_i B_0$	0	0	1	1
00	0	0	1	1
01	0	1	0	1
11	1	0	1	0
10	1	1	0	0

$C_i = 0$

$A_i A_0$	00	01	11	10
$B_i B_0$	0	1	0	1
00	0	1	0	1
01	1	1	0	0
11	0	0	1	1
10	1	0	1	0

$C_i = 1$

$$S_1 = \bar{C}_i \bar{A}_i \bar{A}_0 B_i + \bar{C}_i A_i A_0 \bar{B}_i + \bar{C}_i \bar{A}_i \bar{B}_i \bar{B}_0 + \bar{C}_i A_i \bar{B}_i \bar{B}_0 + C_i A_0 \bar{A}_i \bar{B}_i + C_i \bar{A}_i B_0 \bar{B}_i + C_i A_i A_0 B_i + C_i A_i \bar{B}_i B_0 + \bar{A}_i \bar{A}_0 \bar{B}_i \bar{B}_0 + \bar{A}_i \bar{A}_0 \bar{B}_i B_0 + A_0 A_i B_0 \bar{B}_i + A_0 \bar{A}_i B_0 \bar{B}_i$$

$A_i A_0$	00	01	11	10
$B_i B_0$	0	0	0	0
00	0	0	0	0
01	0	0	1	0
11	0	1	1	1
10	0	0	1	1

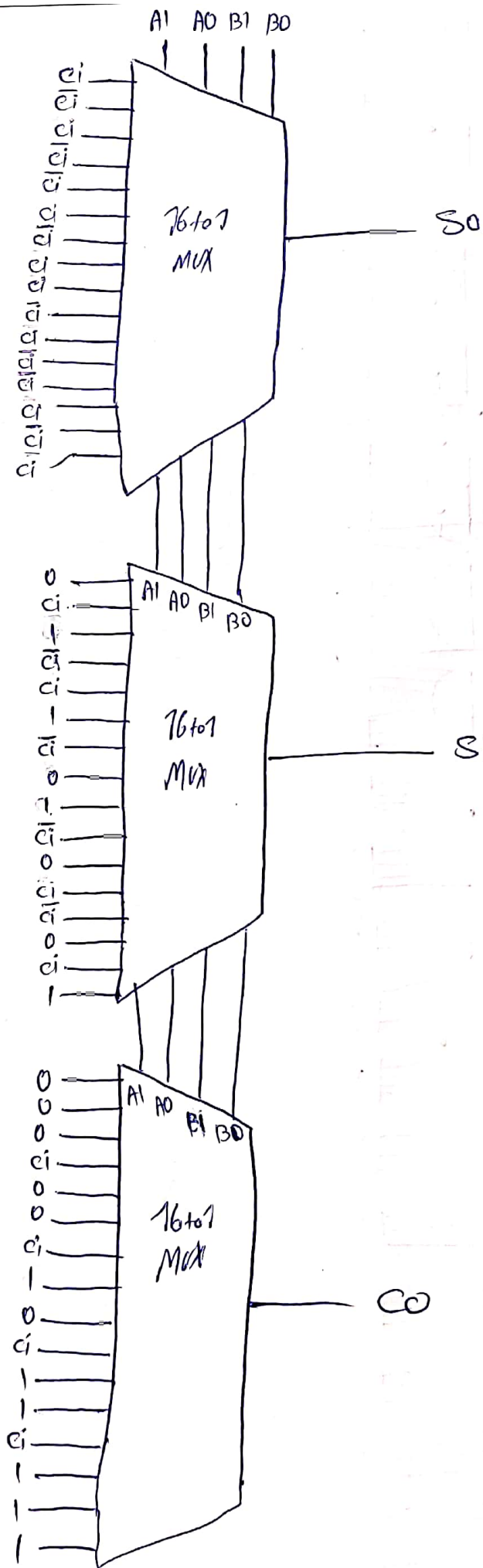
$C_i = 0$

$A_i A_0$	00	01	11	10
$B_i B_0$	0	0	1	0
00	0	0	1	0
01	0	0	1	1
11	1	1	1	1
10	0	1	1	1

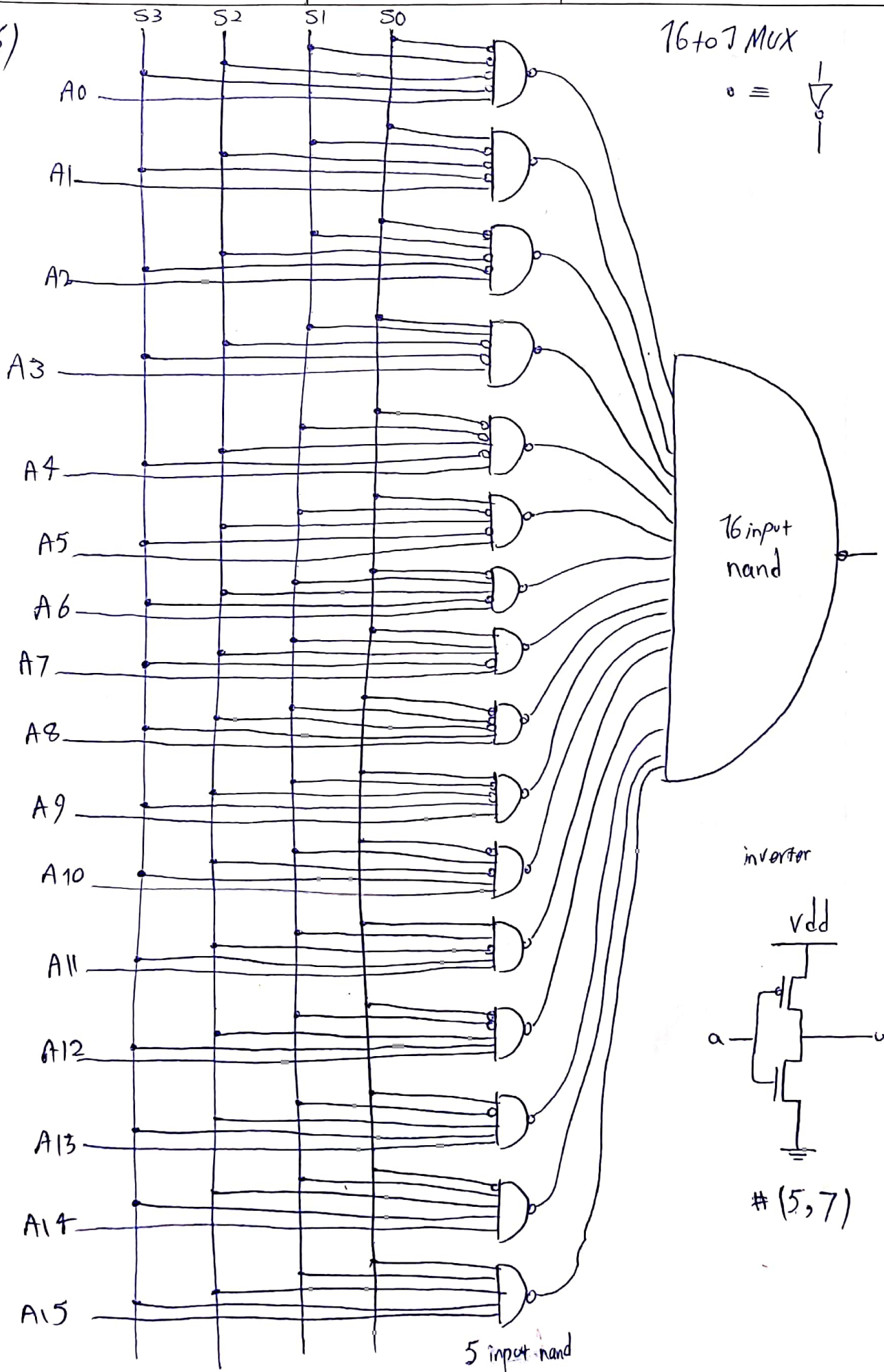
$C_i = 1$

$$C_0 = C_i A_i A_0 + C_i A_i B_0 + C_i B_i B_0 + A_0 B_i B_0 + A_i B_i + A_i A_0 B_0 + C_i A_0 B_i$$

7)
4-6)



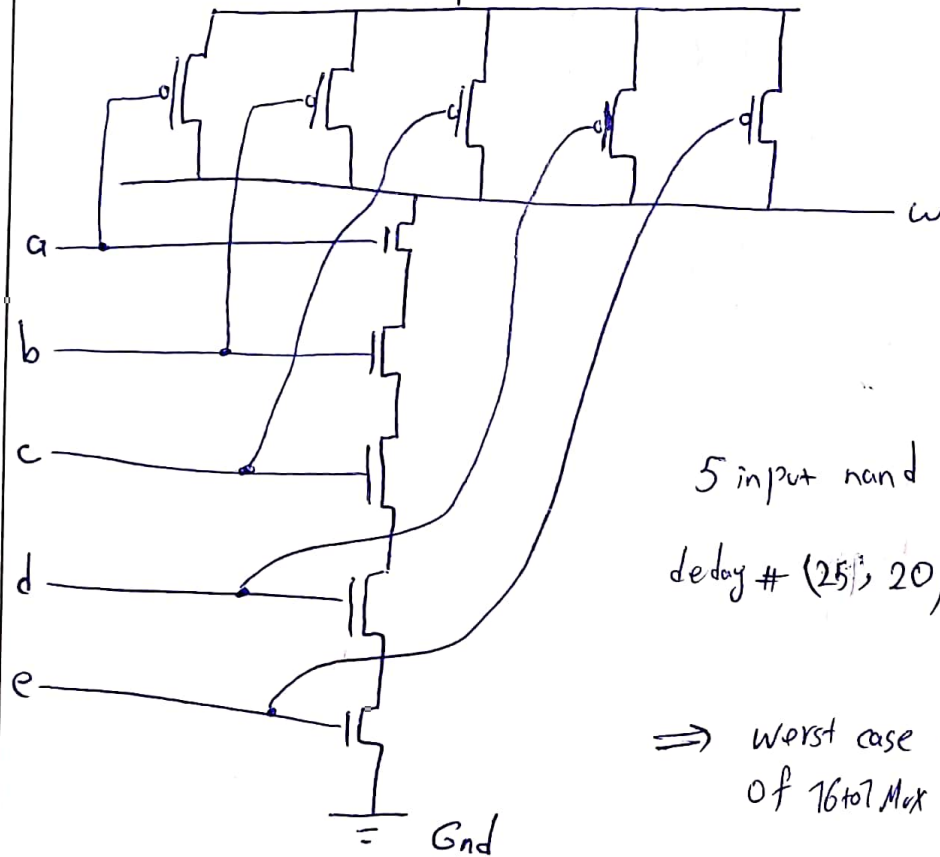
4-6)



4-6)

VDD

5 input nand



5 input nand

delay # (25, 20)

7.6 input nand

delay # (80, 64)

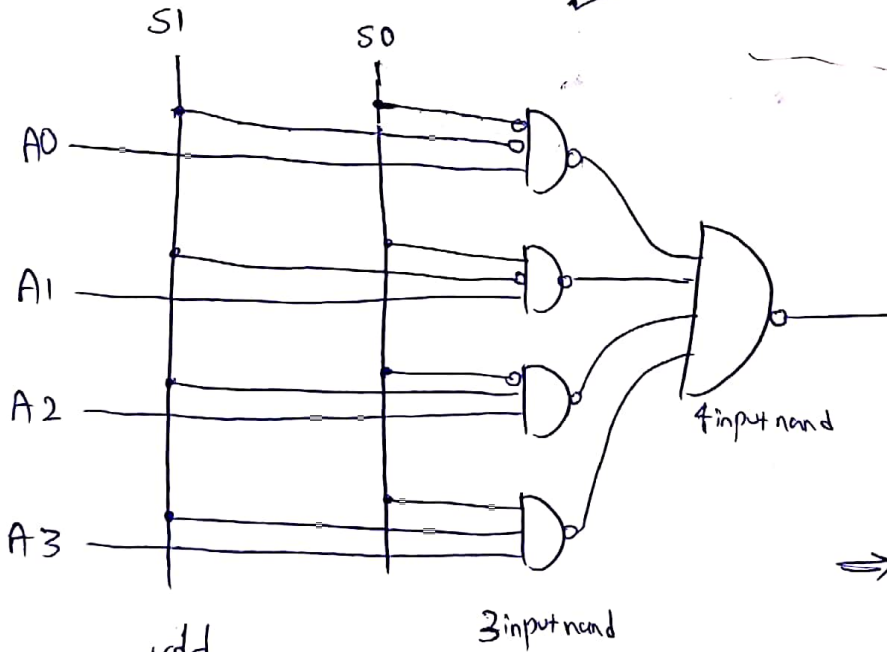
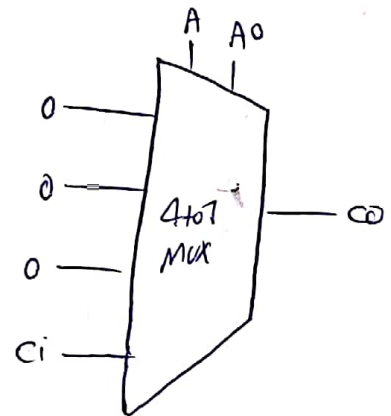
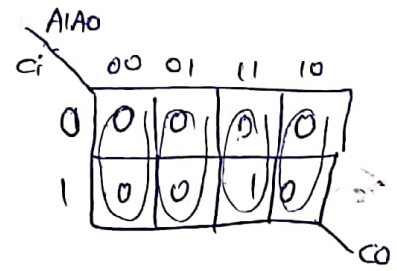
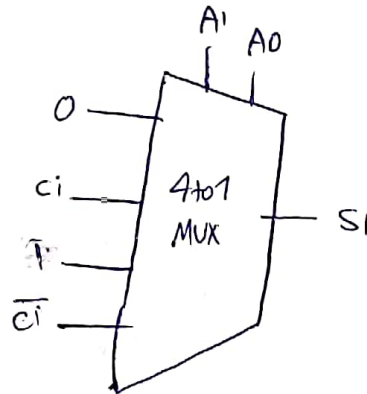
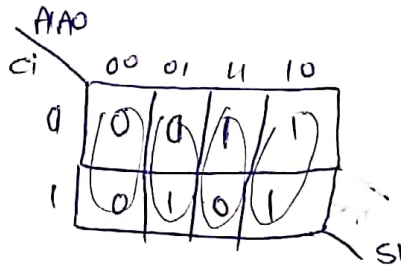
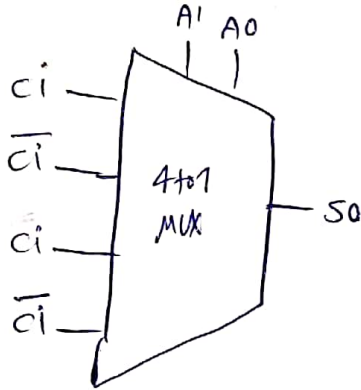
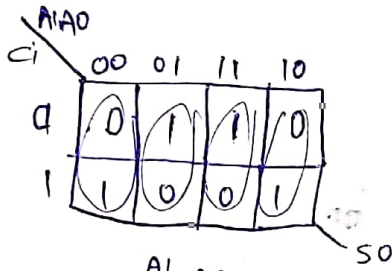
⇒ worst case delay = (5 + 25 + 80, 7 + 20 + 64)
of 16 to 1 Max
= (110, 91)

worst case delay of S # 420

worst case delay of co # (440, 364)

هنگامی که carry out حداکثر تغییر را دارد و تمام بیت های S تغییر می کنند

7-9)



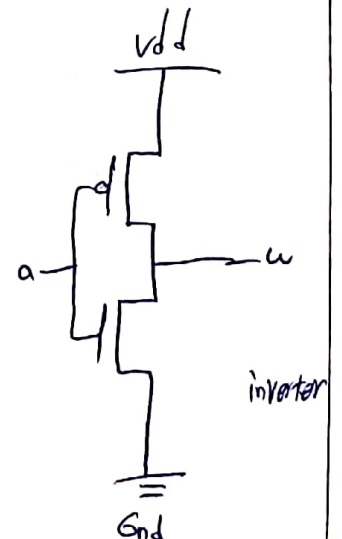
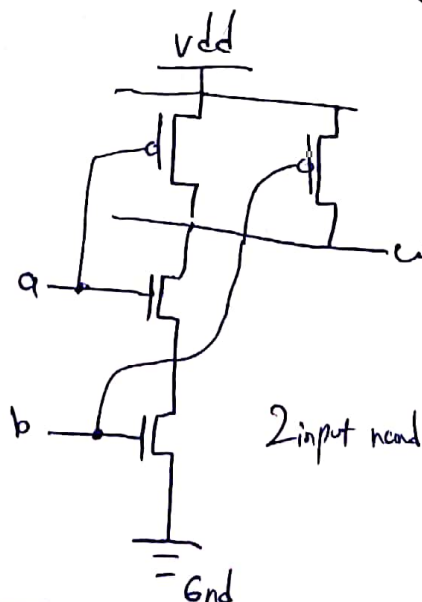
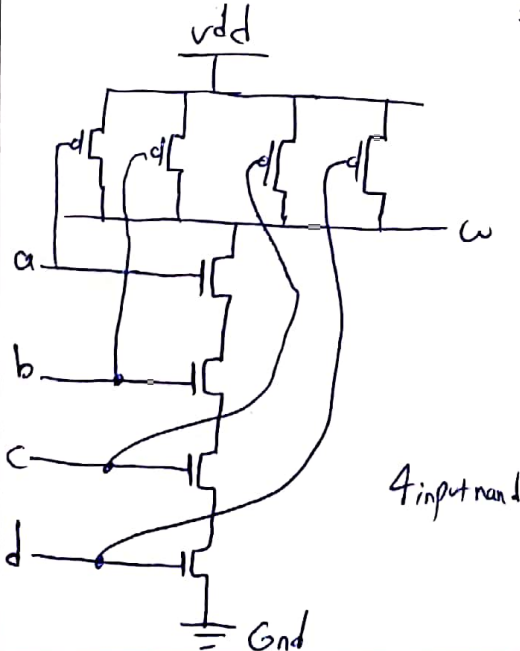
4-to 1 MUX

3 input nand
delay # (15, 12)

4 input nand
delay # (20, 16)

⇒ 4-to 1 MUX delay #

(5+15+20, 7+12+16) = (40, 35)



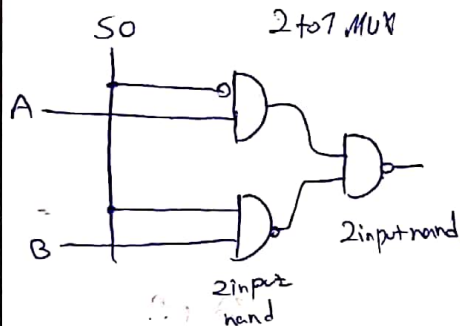
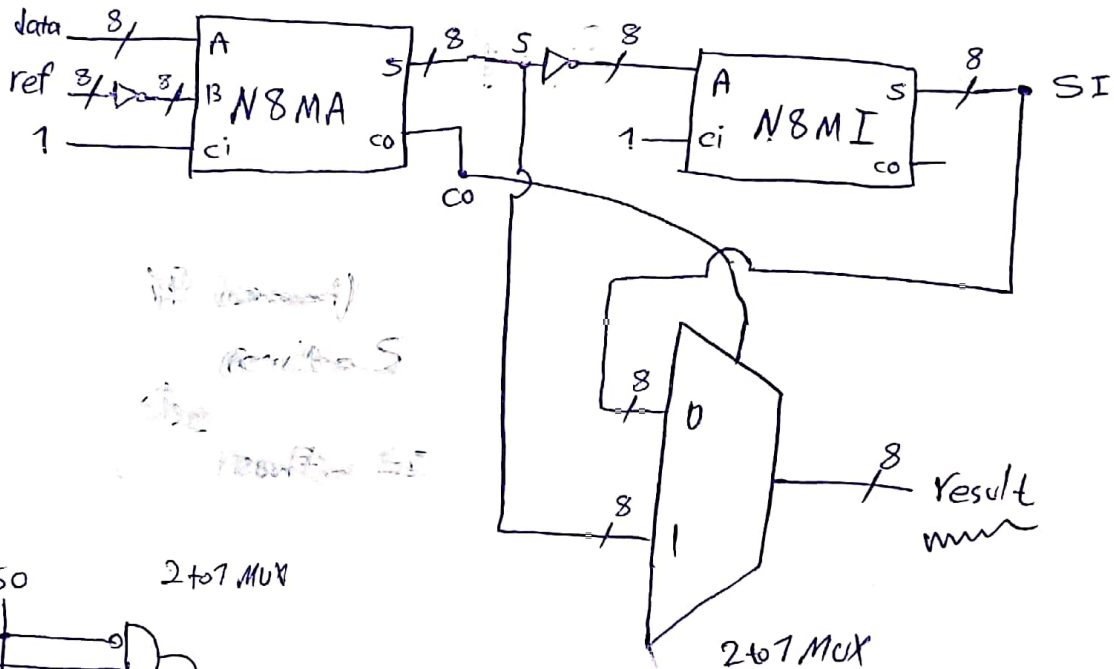
7-9)

worst case delay of $S \# 155$

worst case delay of $co \# (160, 140)$

هنگامی که تمام بیت های S تغییر می کنند.

10-11)



$$\rightarrow \text{delay \#} (15 + 10 + 10, 7 + 8 + 8) = (25, 23)$$

12-13)

