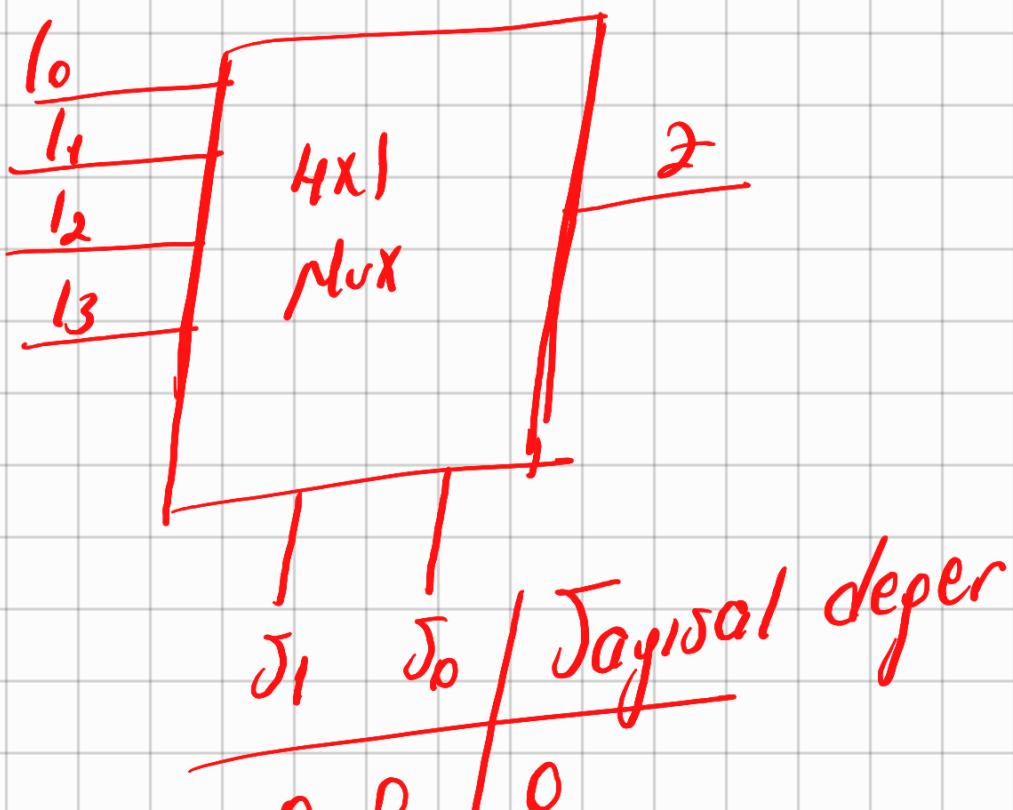
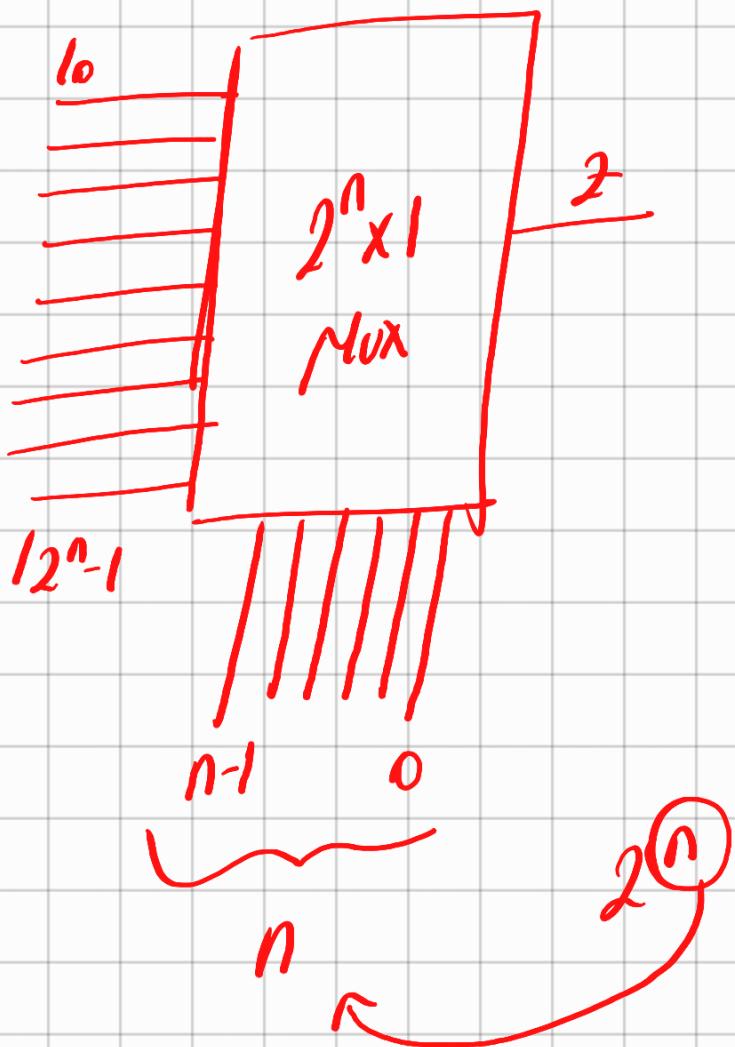


k -seçiciler (Multiplexer-Mux)



0	0	0
0	1	1
1	0	2
1	1	3

Örnek \rightarrow f devrede 4×1 Aşağıda f Tüllancıktan fonksiyonunu x_3, x_4 ile pergetleyenini yazınız
 $\sum f(x_1, x_2, x_3, x_4) +$ Jelam uguları

Örnek

\sum

$$\sum x_1 \ x_2 \ x_3 \ x_4 \mid f(x_1, x_2, x_3, x_4)$$

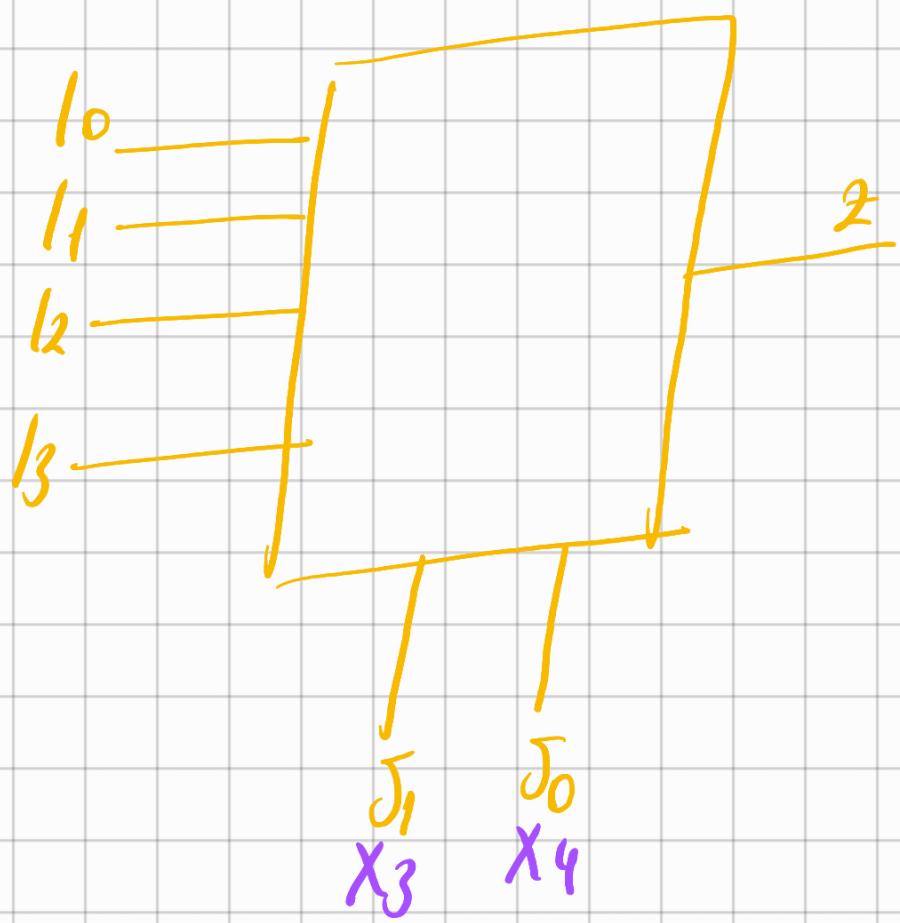
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0

0	1	0	0	0
0	1	0	1	1

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

$$\begin{aligned}
 f \rightarrow & \bar{x}_1 \bar{x}_2 x_3 \bar{x}_4 + \bar{x}_1 \bar{x}_2 x_3 x_4 + \bar{x}_1 x_2 \bar{x}_3 x_4 \\
 & - \bar{x}_1 x_2 x_3 x_4 + x_1 \bar{x}_2 \bar{x}_3 \bar{x}_4 + \\
 & x_1 \bar{x}_2 \bar{x}_3 x_4 + x_1 \bar{x}_2 x_3 \bar{x}_4 \\
 & + x_1 \bar{x}_2 x_3 x_4
 \end{aligned}$$

$\hookrightarrow X_3$ ve X_4 Jecim ugłori bunu kulemeli.



$$\bar{X}_3 \bar{X}_4, X_3 \bar{X}_4, \bar{X}_3 X_4, X_3 X_4$$

Bunların porantezine alırız ifadeleri
Joura toplan deperler artık input-
ları bağlıyabileceğimiz duruma gelir

$$f \rightarrow \bar{X}_3 \bar{X}_4 (X_1 \bar{X}_2) + \bar{X}_3 X_4 (\bar{X}_1 X_2 + X_1 \bar{X}_2)$$
$$+ X_3 \bar{X}_4 (\bar{X}_1 \bar{X}_2 + X_1 \bar{X}_2) + X_3 X_4 (\bar{X}_1 \bar{X}_2 + \bar{X}_1 X_2 + X_1 X_2 + X_1 \bar{X}_2)$$

$$f \rightarrow X_3 X_4 + X_1 \bar{X}_2 + \bar{X}_3 X_4 + X_1 \oplus X_2$$

$$+ X_3 \bar{X}_4 (\bar{X}_2 (\bar{X}_1 + X_1))$$

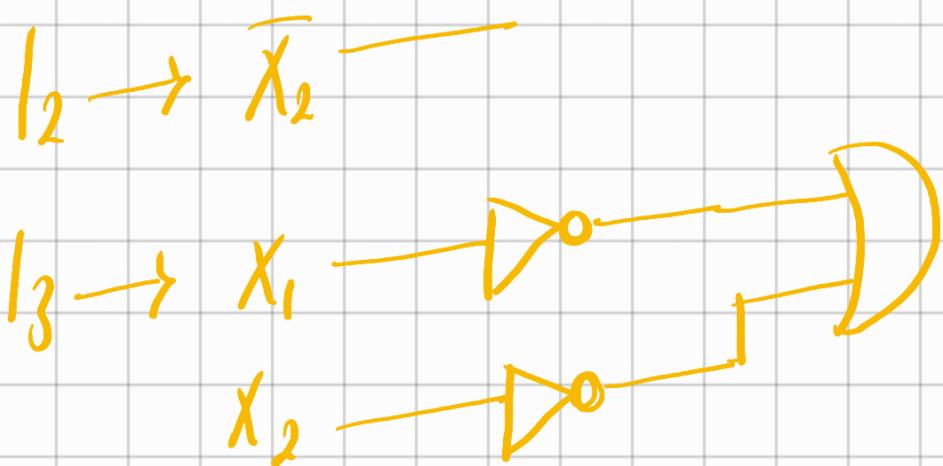
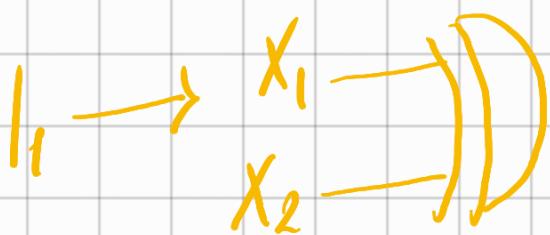
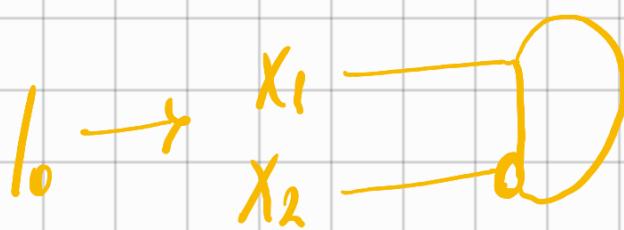
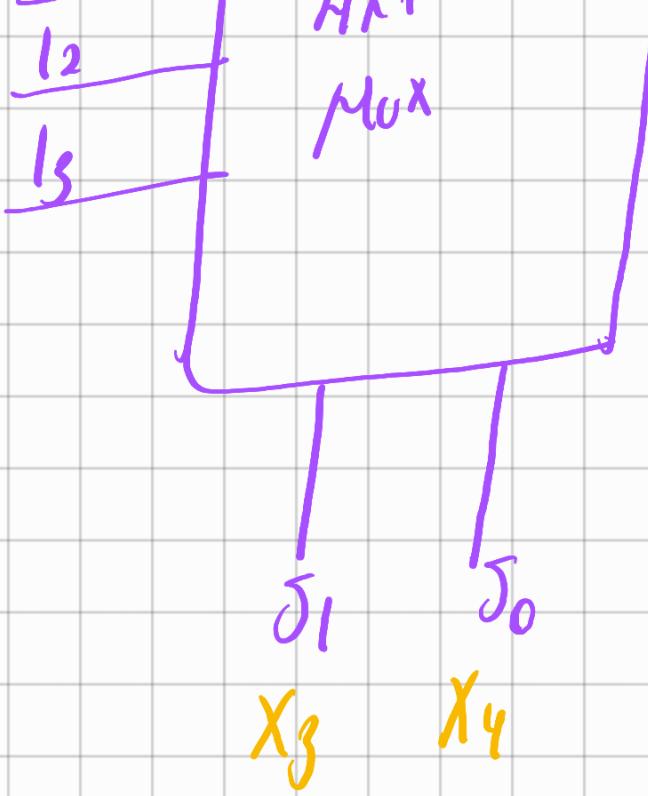
$$\bar{X}_1 + (X_1 \bar{X}_2)$$

$$(\bar{X}_1 + X_1) (\bar{X}_1 + \bar{X}_2) \rightarrow (\bar{X}_1 + \bar{X}_2)$$

Σ_1 Σ_0

a	X_3	X_4	I_a
0	0	0	$X_1 \bar{X}_2$
1	0	1	$X_1 \oplus X_2$
2	1	0	\bar{X}_2
3	1	1	$\bar{X}_1 + \bar{X}_2$





Örnek 2 \rightarrow Jelgin valorini X_3, X_4 yerine X_1 ve X_2 yoposat ne olur

(Bu sefer X_1 ve X_2 üzerinden paranteze olur içerdeki ifadelere bakırız)

$$\hookrightarrow \bar{X}_1 \bar{X}_2, \bar{X}_1 X_2, X_1 \bar{X}_2, X_1 X_2$$

$$\begin{aligned} \hookrightarrow f \rightarrow & \bar{X}_1 \bar{X}_2 (X_3 \bar{X}_4 + X_3 + X_4) + \bar{X}_1 X_2 (\bar{X}_3 X_4 \\ & + X_3 X_4) \\ & + X_1 \bar{X}_2 (\bar{X}_3 \bar{X}_4 + \bar{X}_3 X_4 + X_3 \bar{X}_4 + X_3 X_4) \\ & + X_1 X_2 (0) \end{aligned}$$

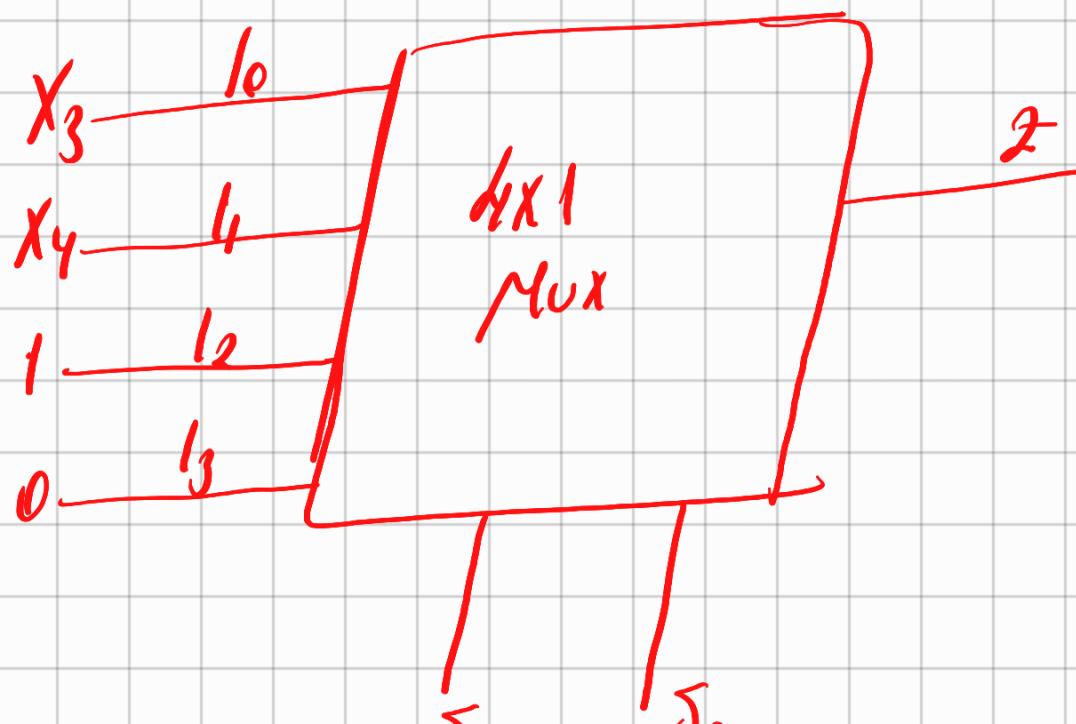
$$\begin{aligned} \rightarrow & \bar{X}_1 \bar{X}_2 (X_3 (\bar{X}_4 + X_4)) + \bar{X}_1 X_2 (X_4 (\bar{X}_3 + X_3)) \\ & + X_1 \bar{X}_2 (\bar{X}_3 (\bar{X}_4 + X_4)) + X_3 (\bar{X}_4 + X_4) \end{aligned}$$

$$\rightarrow \bar{x}_1 x_2 x_3 + \bar{x}_1 x_2 x_4 + x \bar{x}_2 + x_1 x_2 (0)$$

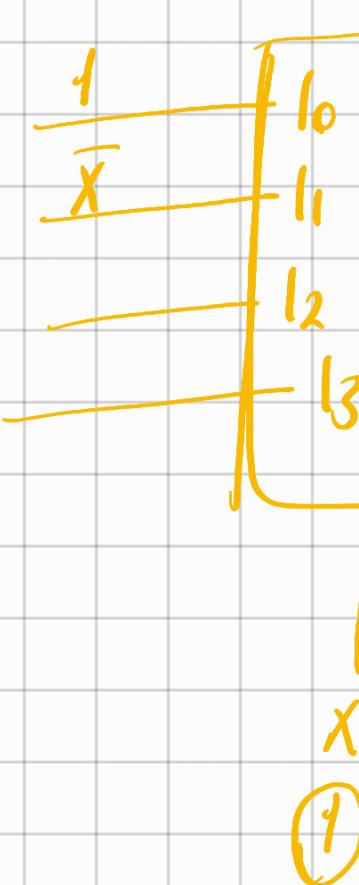
$\bar{x}_3 + x_3$

$\frac{1}{3}$

Q	$x_1 x_2$	I_Q
0	00	x_3
1	01	x_4
2	10	1
3	11	0



x_1 x_2



$(x,y).1$
 $(x\bar{y})\bar{x}$

$$z = l_0(\bar{x}\bar{y}) + l_1(\bar{x}y)$$

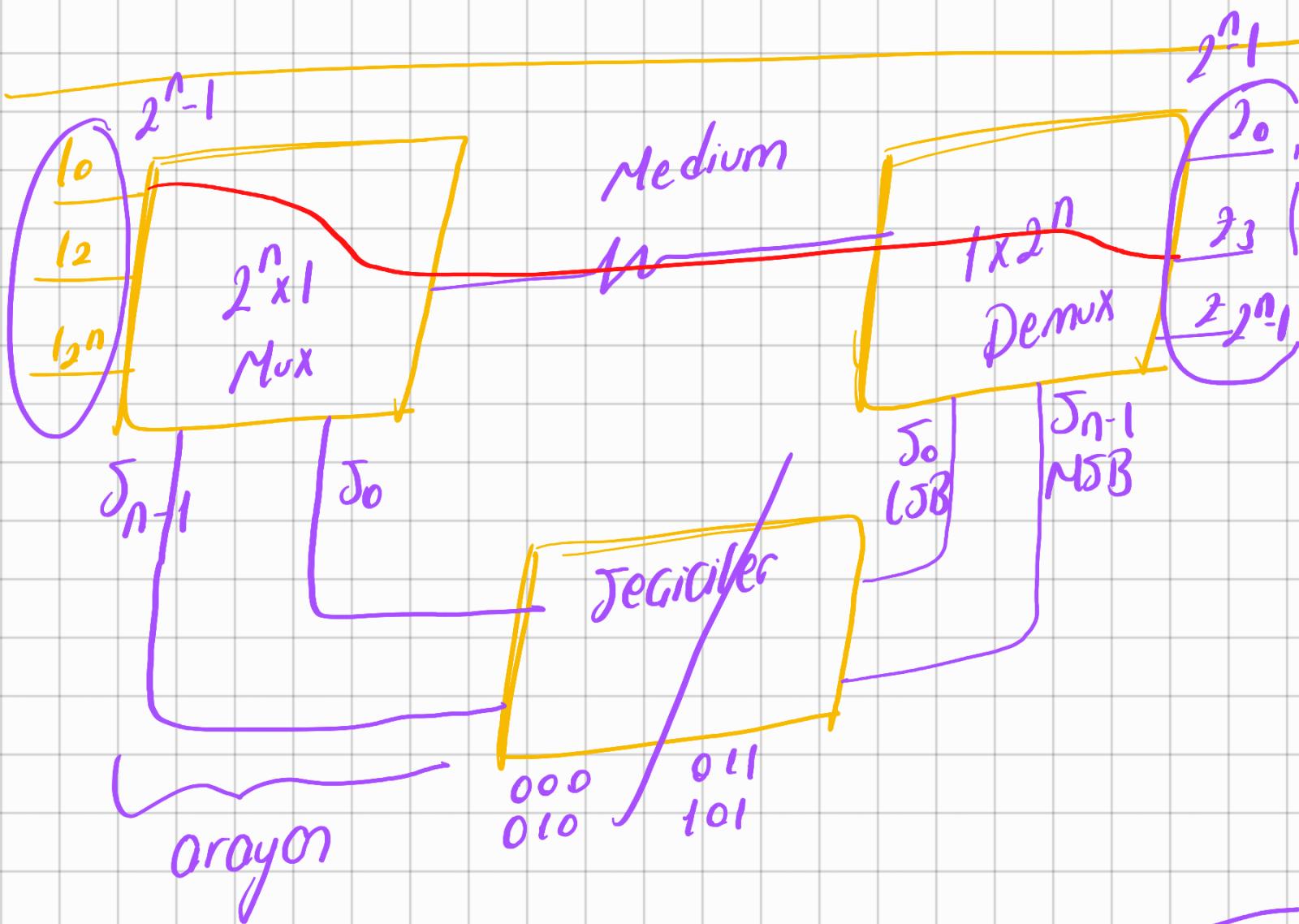
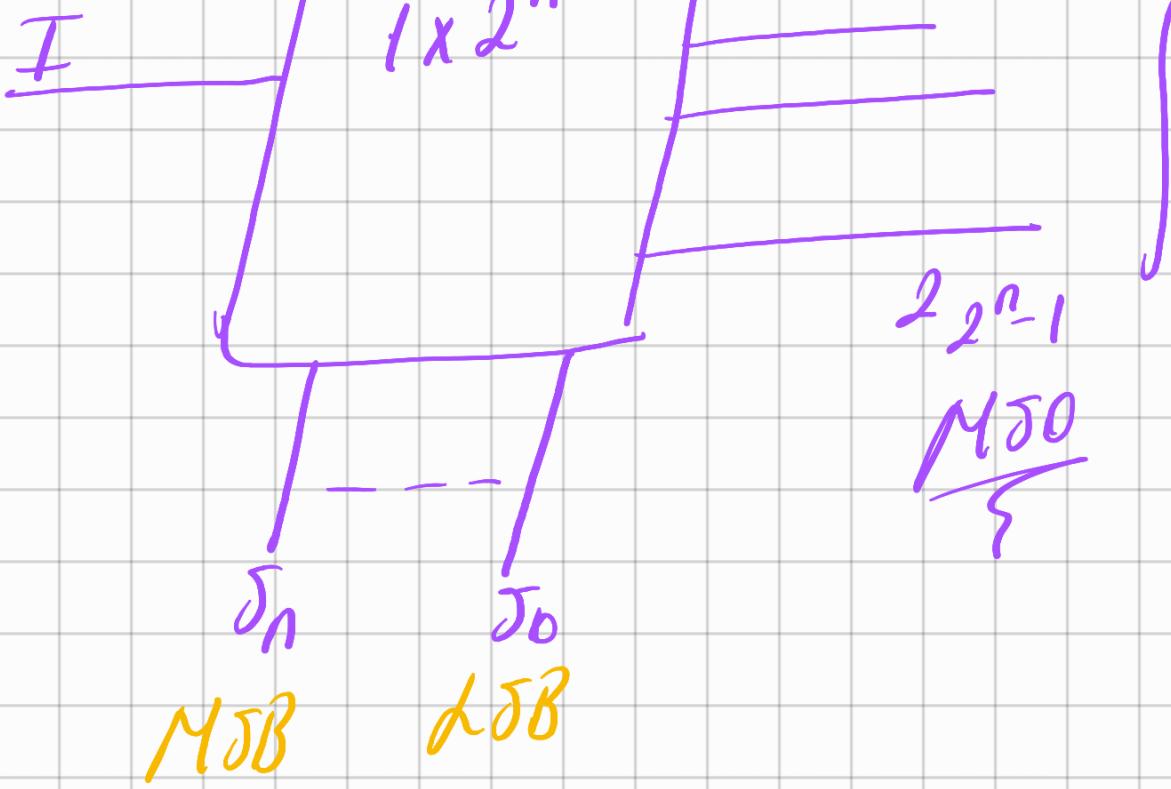
$$l_2(x\bar{y}) + l_3(xy)$$

$x_1' + x_3$

\hookrightarrow Sınavlarda böyle de gitabilir

Duplicator (Demultiplexer - Demux)

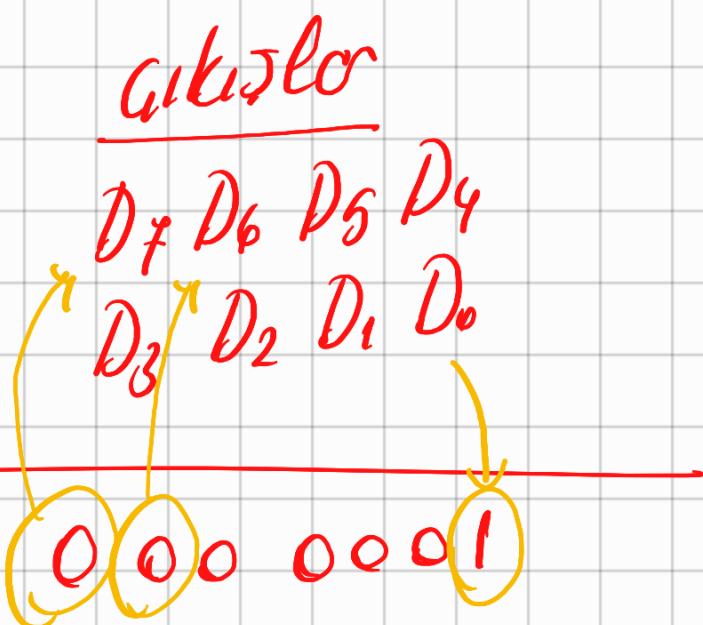




Kod Gözlemevi (Decoder) 1×2^n
 3×8

decoder
mesela

sayısal
değer | spiraller
 $x \ y \ z$



0 0 0 0

001 00000

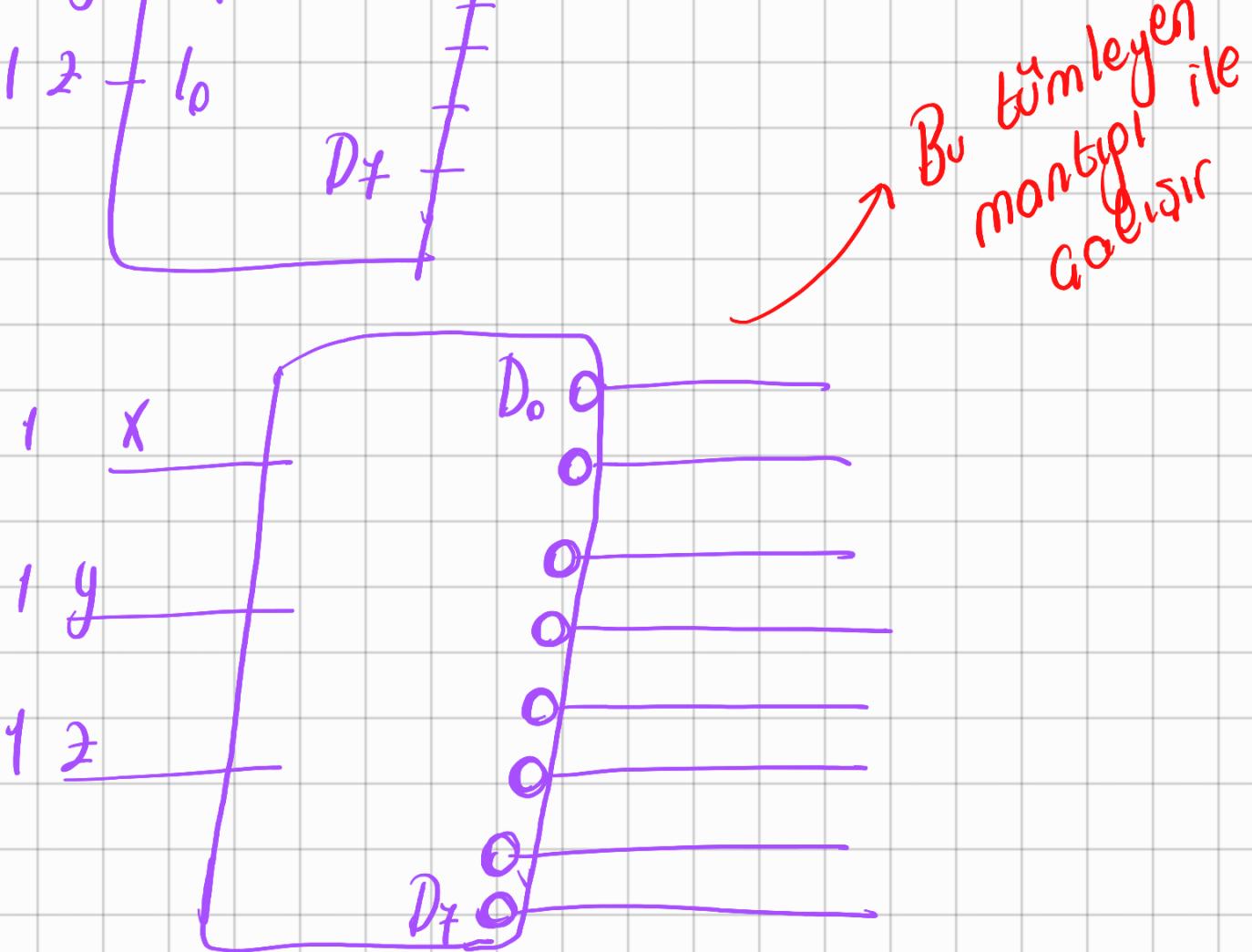
5 1 0 1

100 00000 00
01111111

Y 1 1 1

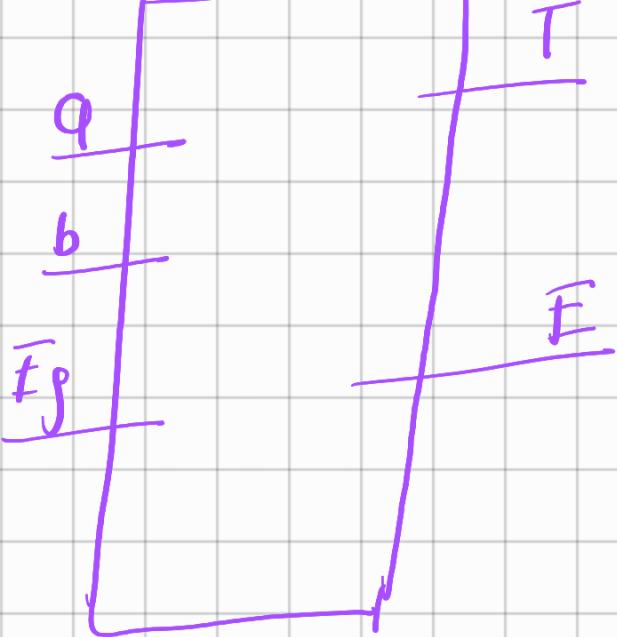
tümleyen
montipinde
f böyle
olur

1 x f f
0 y f f



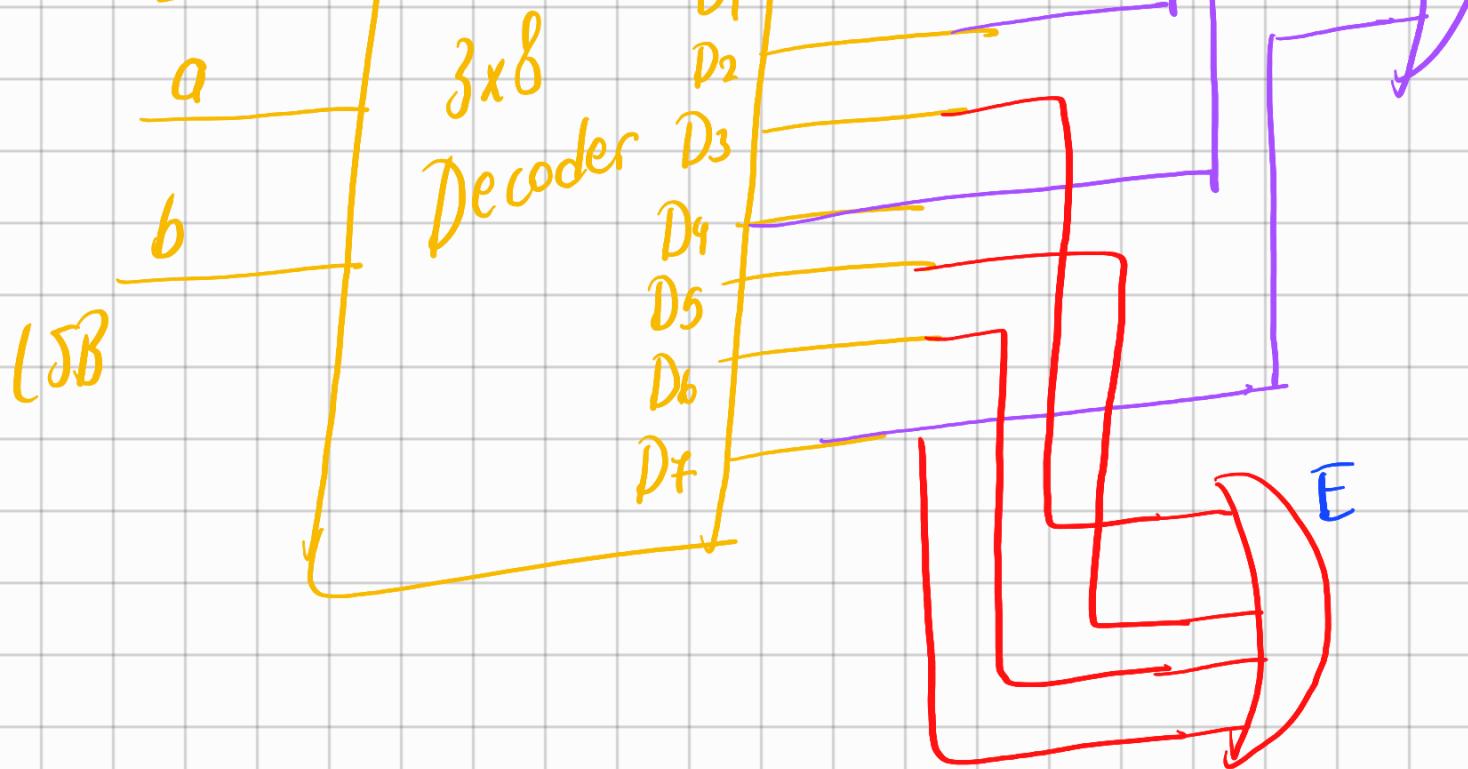
Örnek tam toplamı Dersre
 toplam Gittiği $(a, b, E_g) =$
 elde Gittiği (a, b, E_g) t uretiyor

$\sum (1, 2, 4, 7)$ 'de toplam Gittiği
 $\sum (3, 5, 6, 7)$ 'de elde Gittiği t uretir

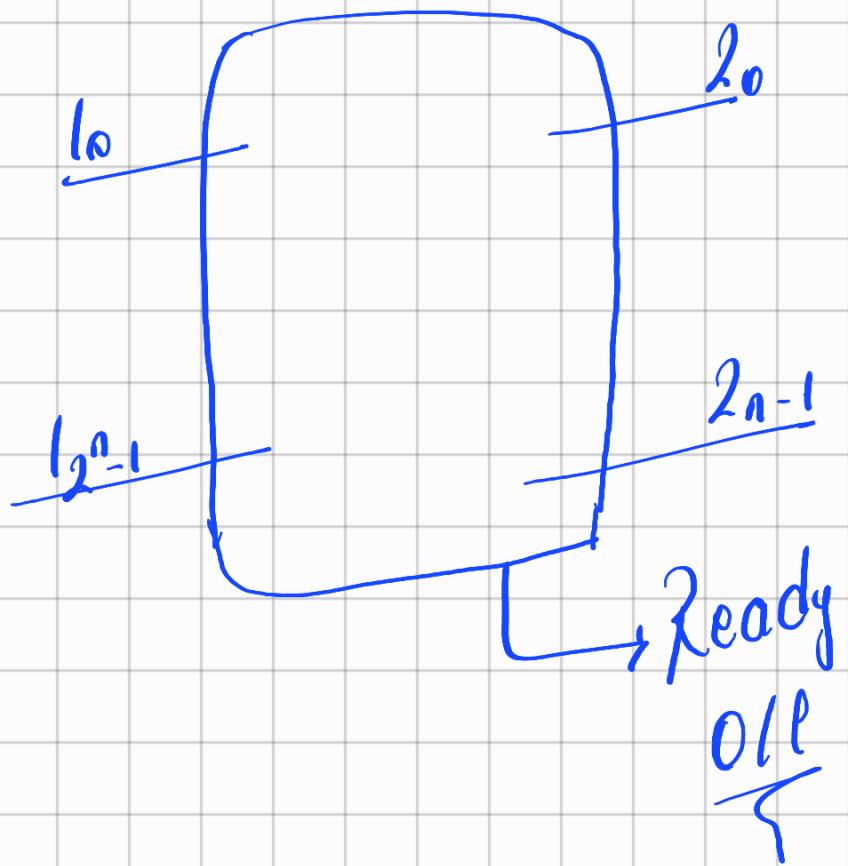


F_S	a	b	T	E
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1





Kodlayia (Encoder) $2^n \times n$



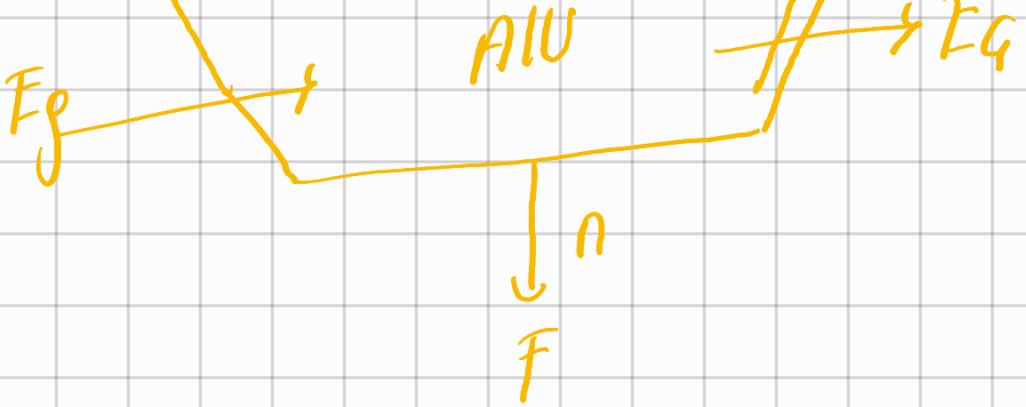
4x2 Encoder

<u>Girişler</u> MSB I ₃ I ₂ I ₁ I ₀	<u>Cıktılar</u> X Y	<u>Hazır</u> (ready)
0 0 0 0	0 0	0
0 0 0 1	0 0	1
0 0 1 0	0 1	1
0 1 0 0	1 0	1
1 0 0 0	1 1	1

Bunlar ready'nin 1 olduğu yerler

Aritmetik logic Unit (ALU)





Örnek → Veri girişleri \underline{A} $a_3 a_2 a_1 a_0$ \underline{B} $b_3 b_2 b_1 b_0$

elde
giriş glikozlori F_g / E_g

Jonug $F(f_3 f_2 f_1 f_0)$

islem
kodu

$M(m, m_o)$ $\rightarrow 2^{M \rightarrow 2} = 4$
islem
tanimla-
nobilir

m, m_o	islem	Toplama	TT (tam toplayıcı)
0 0	$F = A + B$	Aikomo	TG (tam aikorucu)
0 1	$F = A - B$		Complementi (A) ^C

10

$F = A$

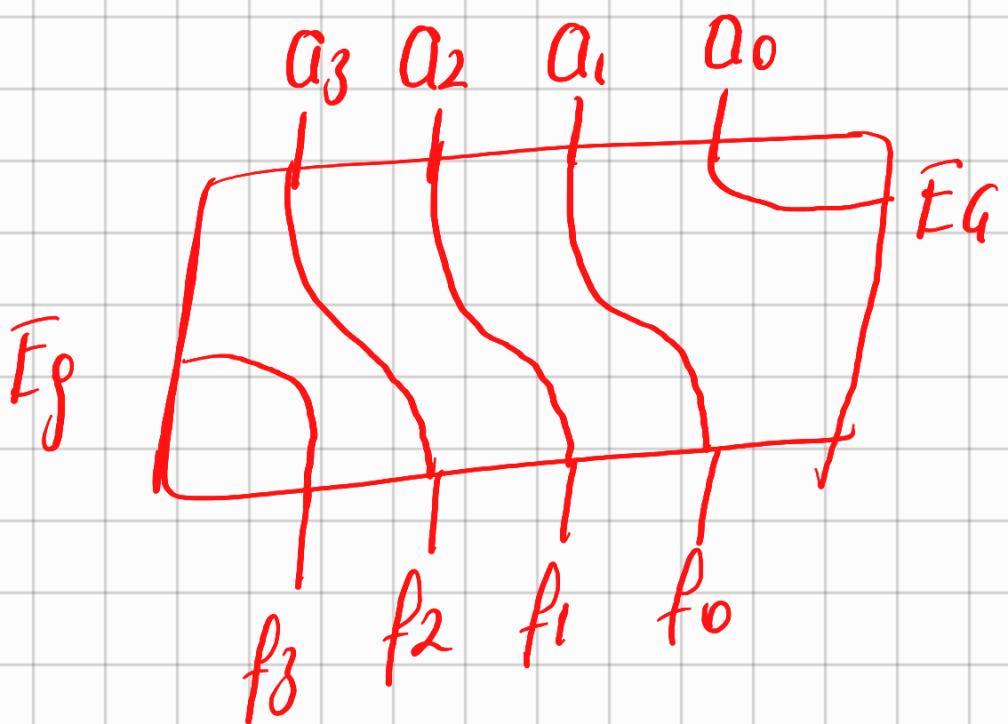
11

$F = A_{IR}$

A 'nin komple

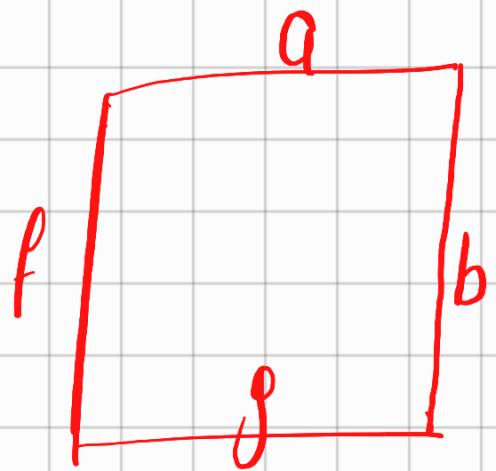
A 1 bit shift right
(öteleşici)

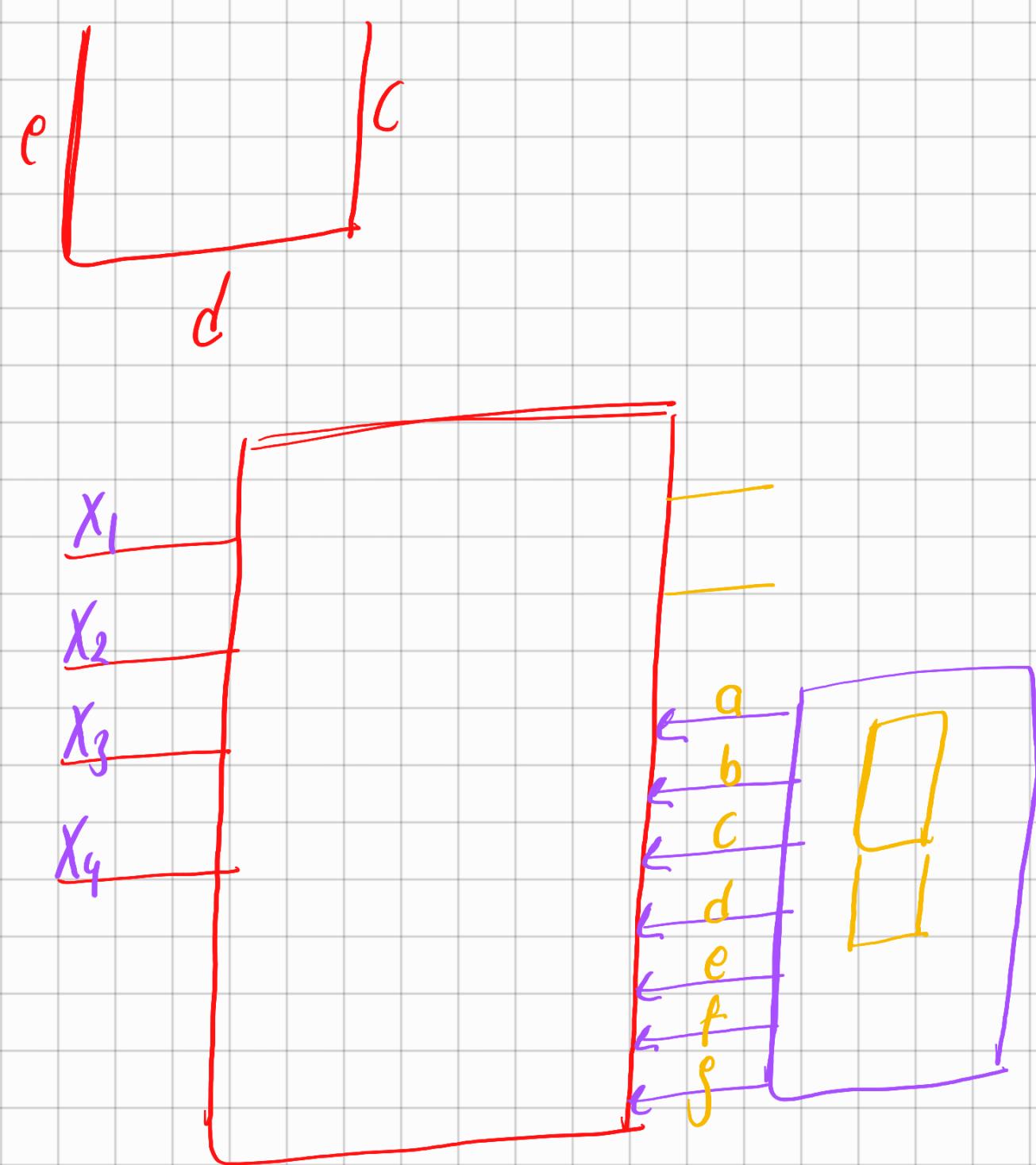
(tümle
yici)



Burda bir şey var

f segment display





$\gamma_d > 0$ işik resir

10 sayı
 $2^3 \rightarrow 8$
 $2^4 \rightarrow 16$
 ↳ 6 boş aikos

giriş
 $x_1 \ x_2 \ x_3 \ x_4$

Girdiler
 $a \ b \ c \ d \ e \ f \ g$

0 0 0 0

1 1 1 1 1 0

0 0 0 1

0 1 1 0 0 0

1

1

1

1

[1 0 0 1]

1 1 1 0 11

→ yazabilcepmi^z
en büyük
sayı

10 10

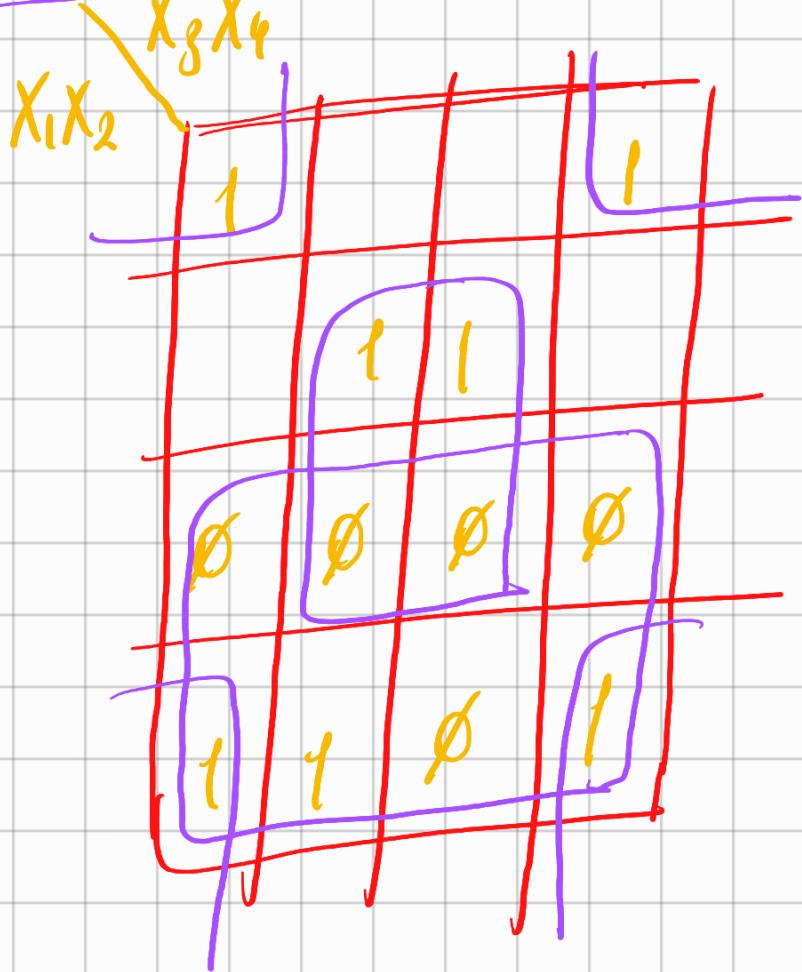
Ø Ø Ø Ø Ø Ø Ø

!

!

11 11

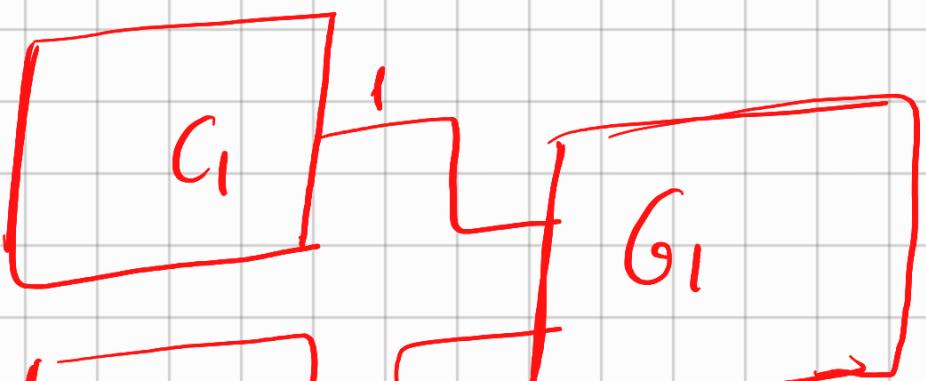
Ø Ø Ø Ø Ø Ø Ø

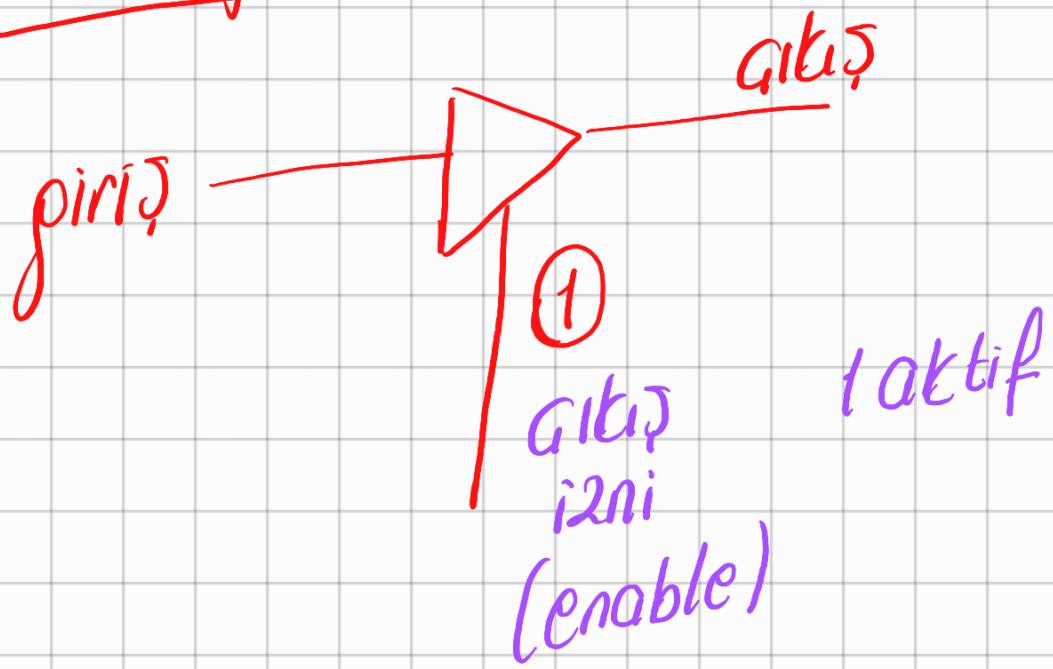
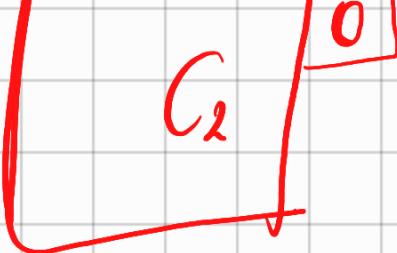


$$\hookrightarrow Q \rightarrow X_1 + \overline{X}_2 \overline{X}_4 + X_2 X_4$$

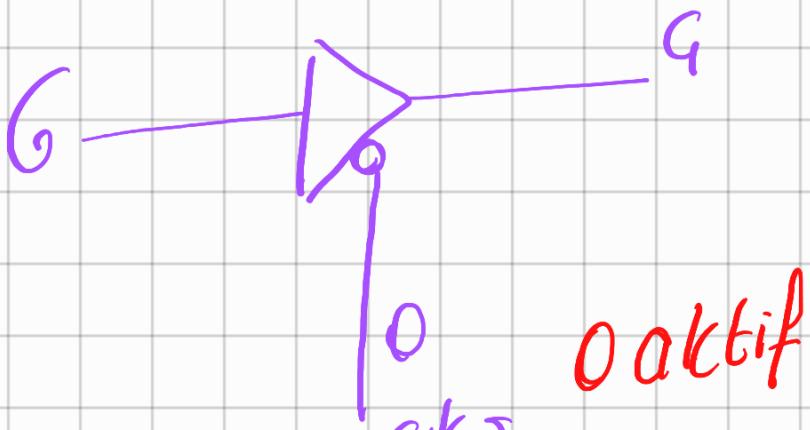
$$\hookrightarrow X_1 + X_2 \oplus X_4$$

Beffer (tanpon)





Giriş i2ni	giriş	Giriş
0	0	YE
0	1	0
1	1	1



Gitar
i2ni

Gitar
i2ni

gitar

Gitar

0

0

1

1

0

1

0

1

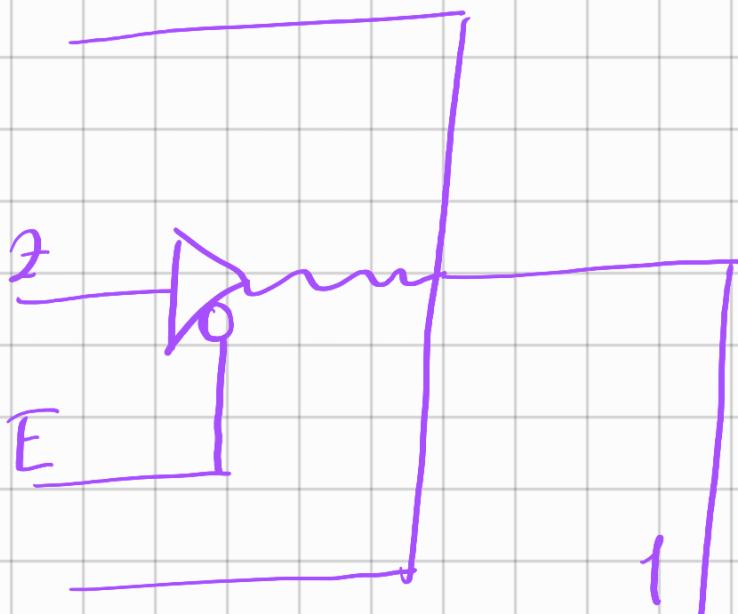
0

1

yüksek empedans
yüksek empedans

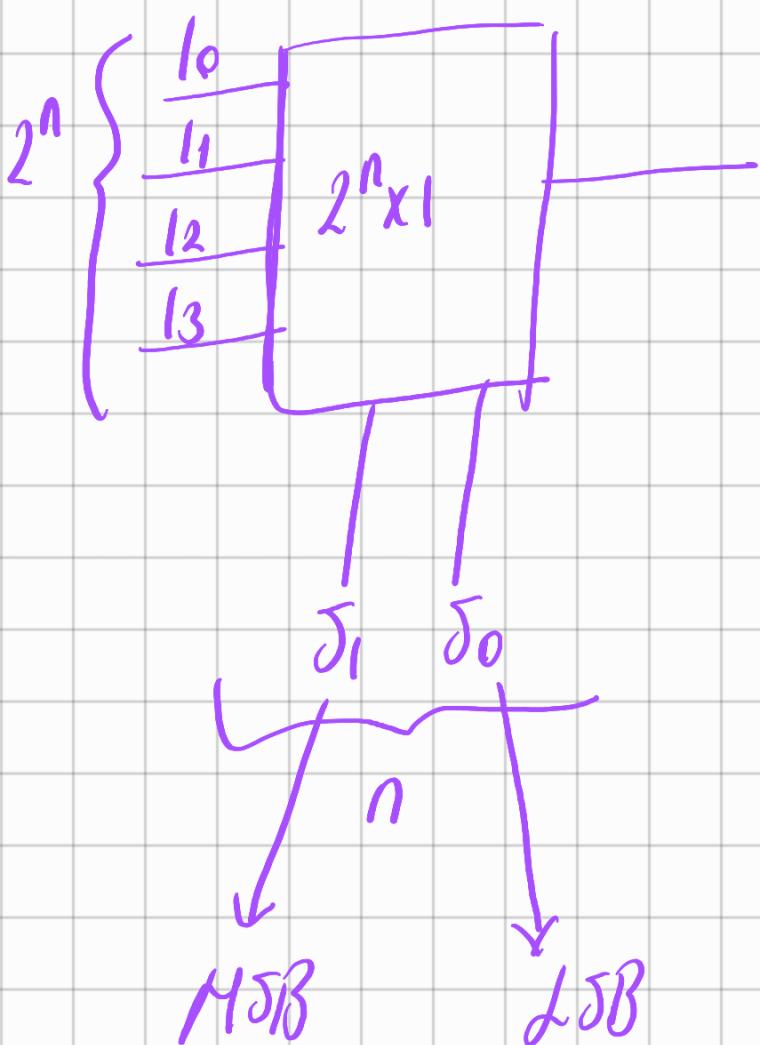
↳ yüksek
empedans
demek
okun okuyacak
demek

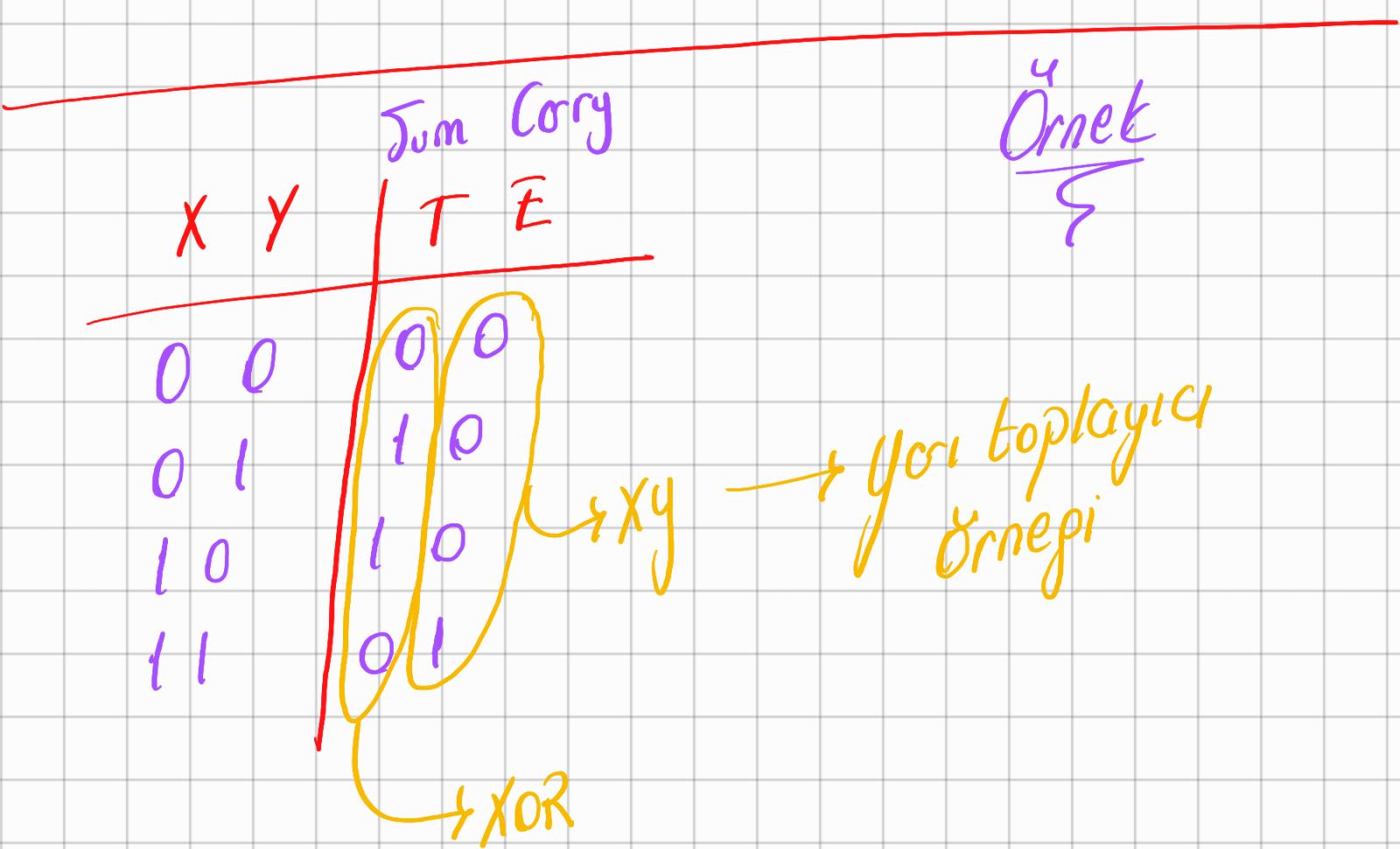
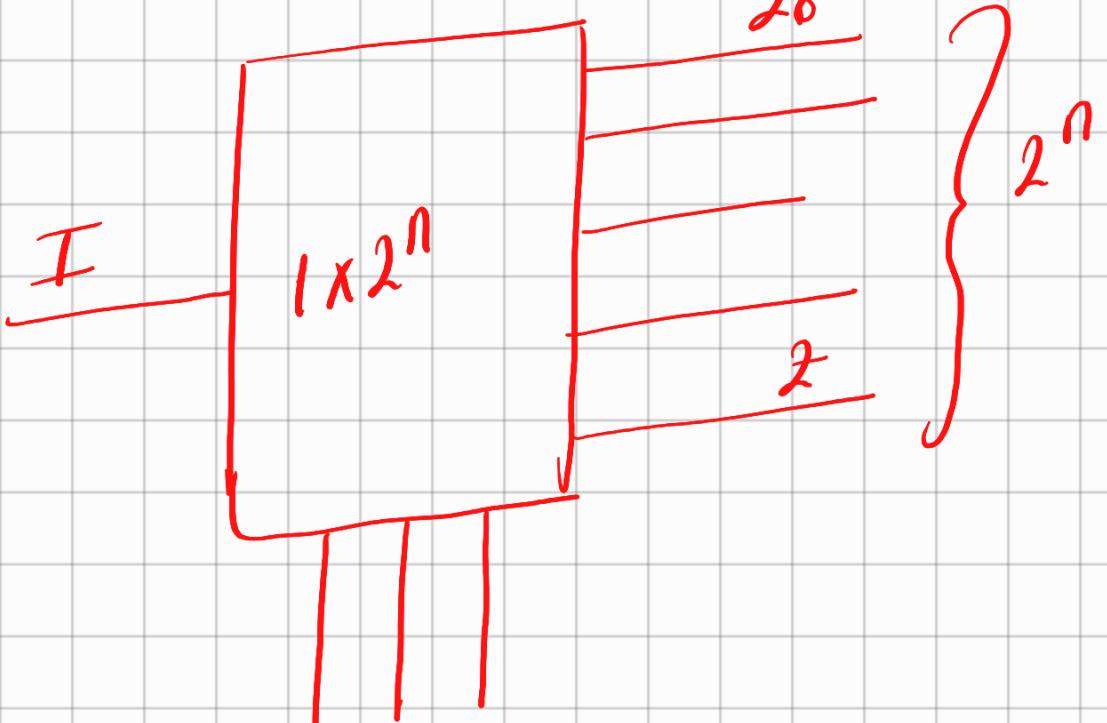
1- Bufferler
2- Pull up dirençleri





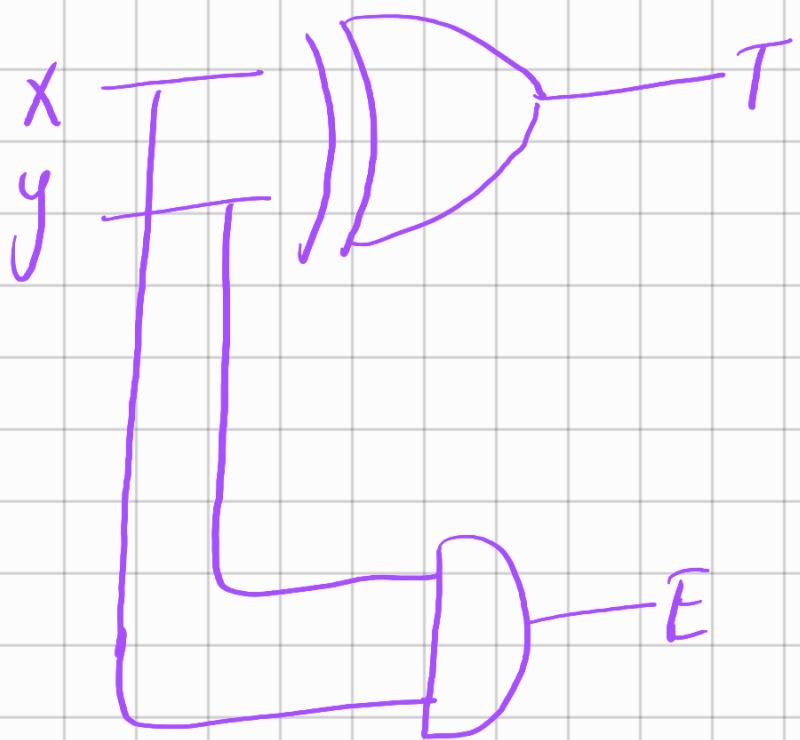
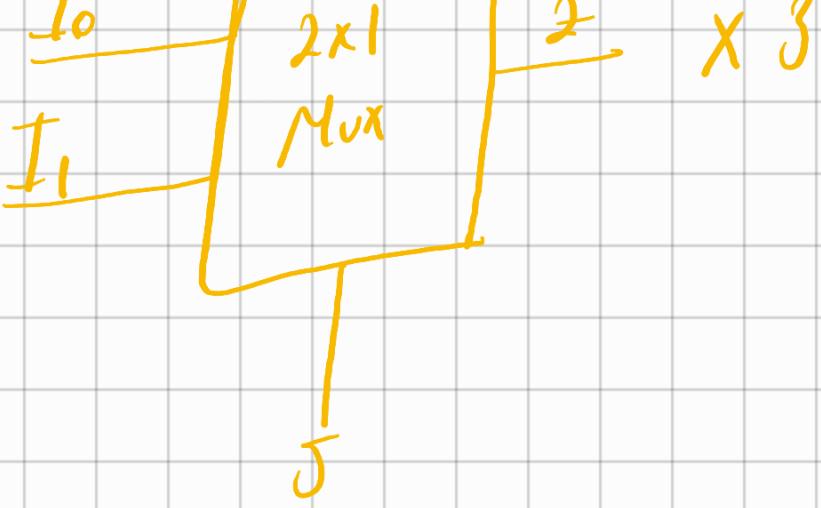
Gelen Sınerin Kayıtları





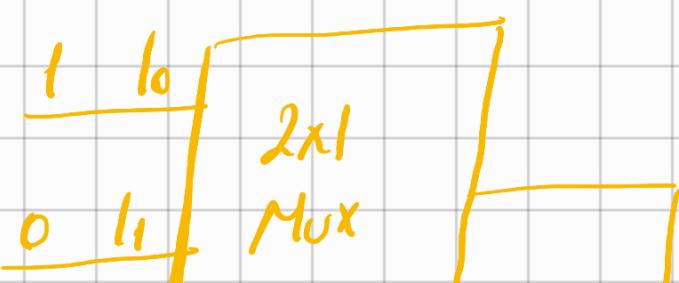
Örnek

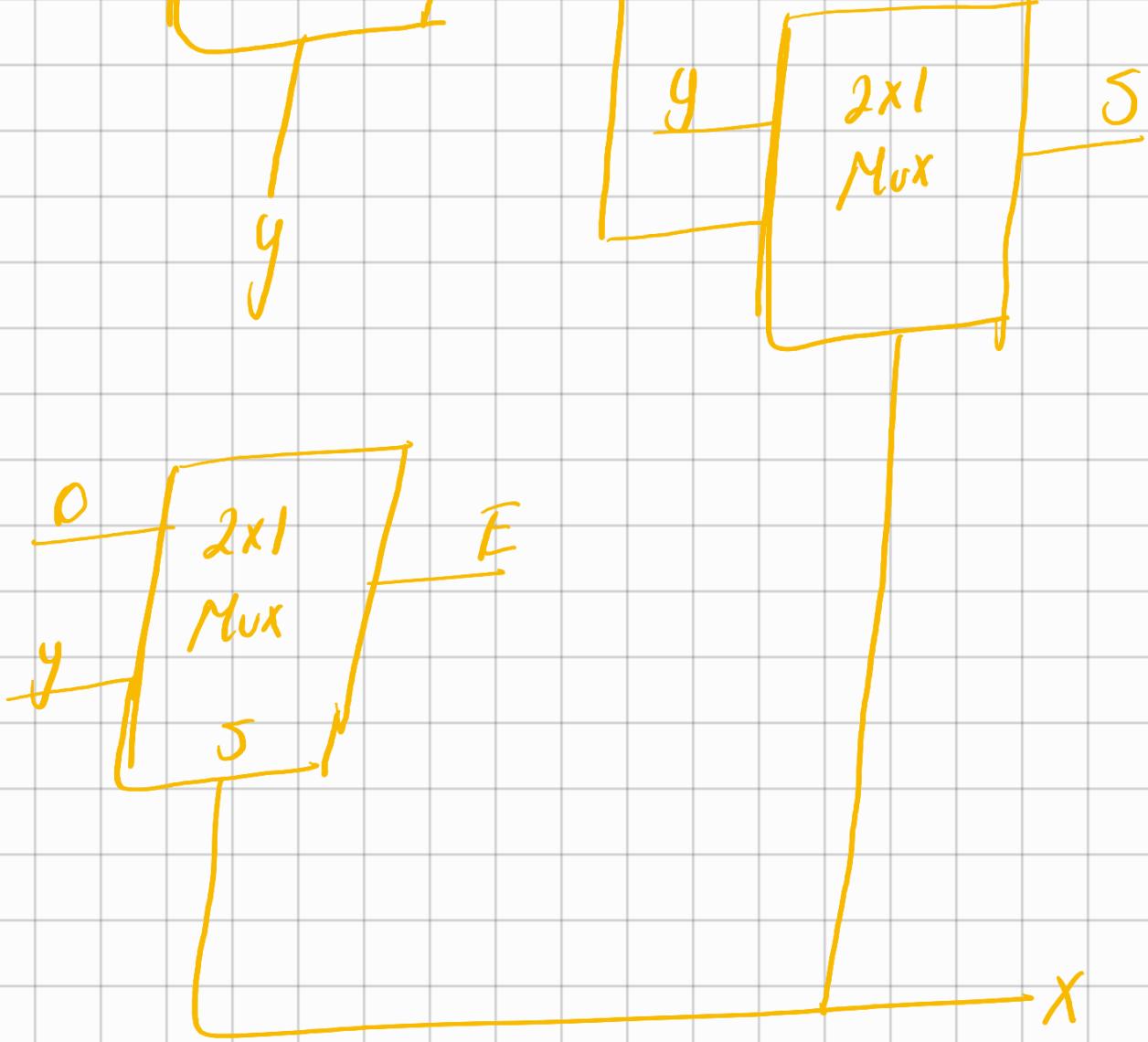
3 tane 2×1 Mux kullanarak yeri toplayıcı gerçekleyiniz



x
 y
 0
 1

Gözüm
 ↴





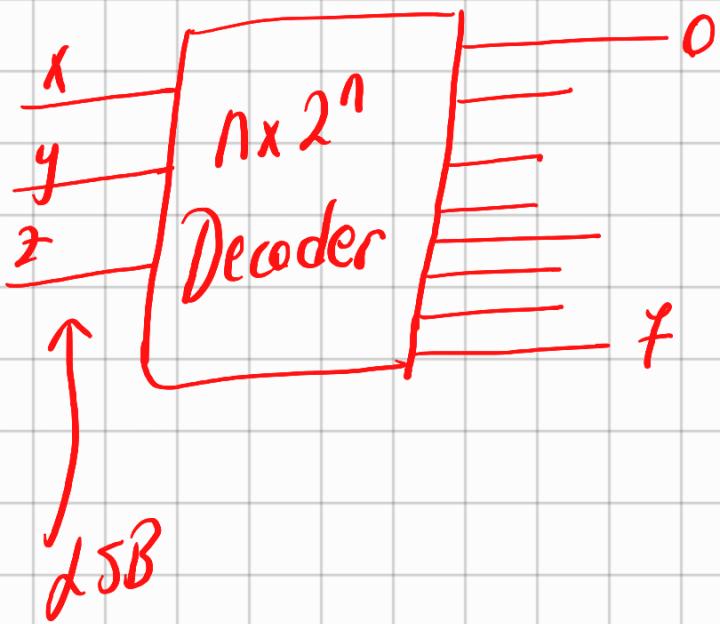
4

Kod çözücü (Decoder)

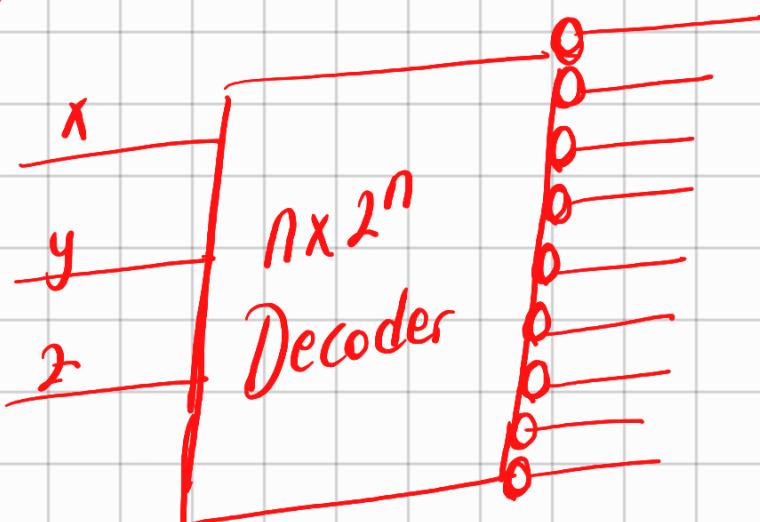
$$\lambda = 3$$

110 / 1011111

tümleyen girişler



1 oktif
0 pozif



1 pozif
0 aktif

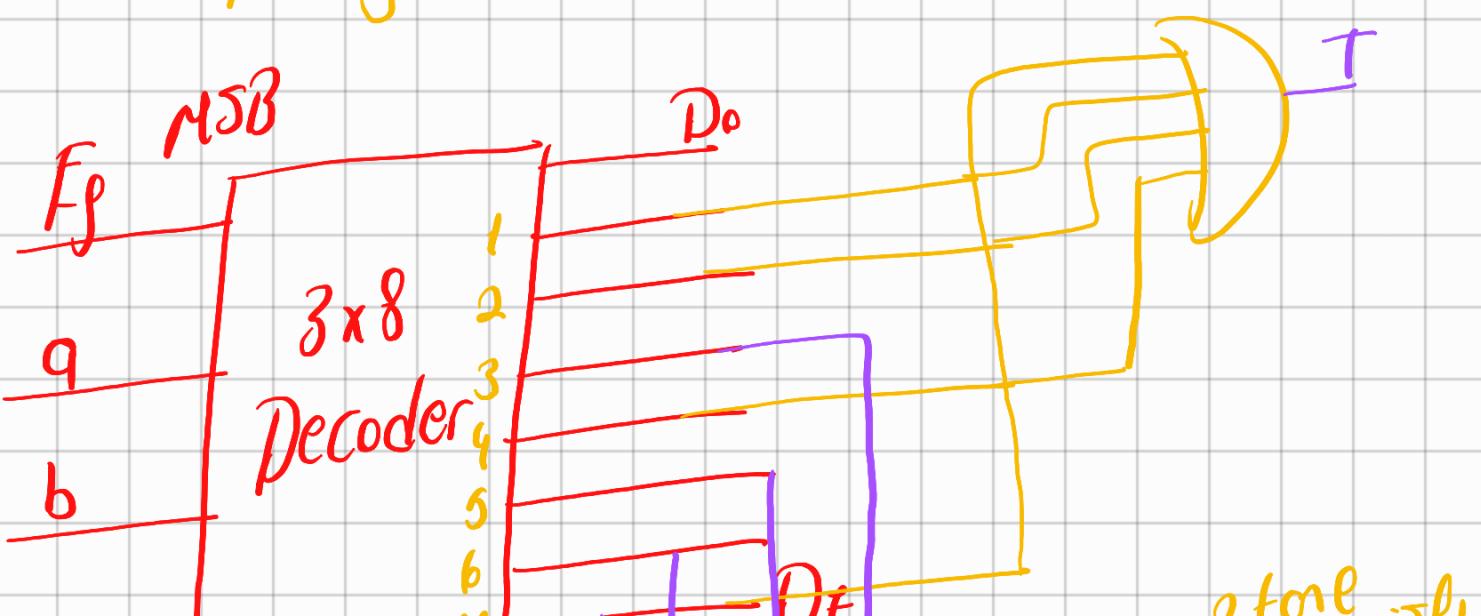
tümleyen
girişler

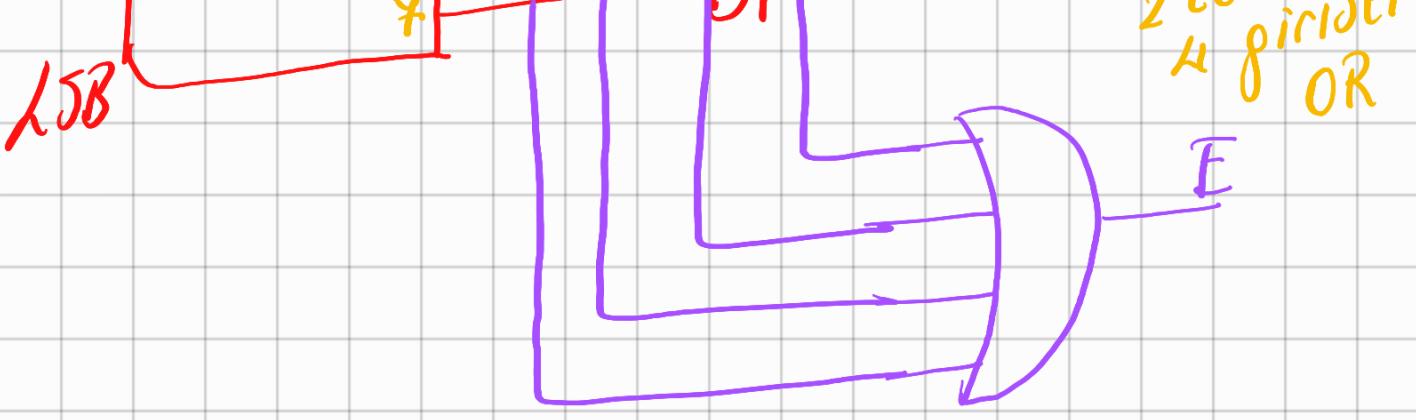
Ör Tom toplayıcıyı Kod Görüçü kullanarak
tasarılmınız

E_g	a	b	T	E
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

$$T(\bar{E}_g, a, b) \rightarrow \sum (1, 2, 4, 7)$$

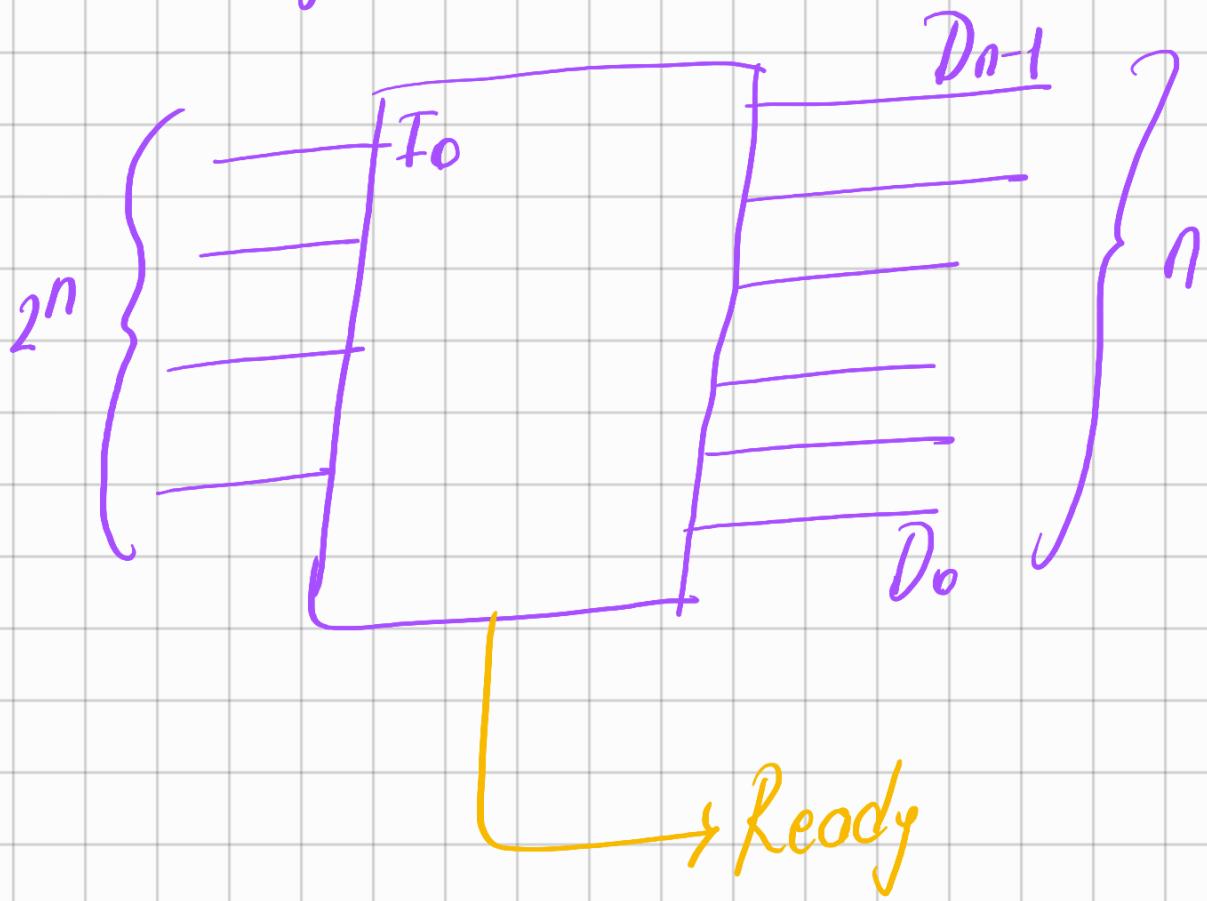
$$E(\bar{E}_g, a, b) \rightarrow \sum (3, 5, 6, 7)$$





⑤ Kodlayıcı (Encoder)

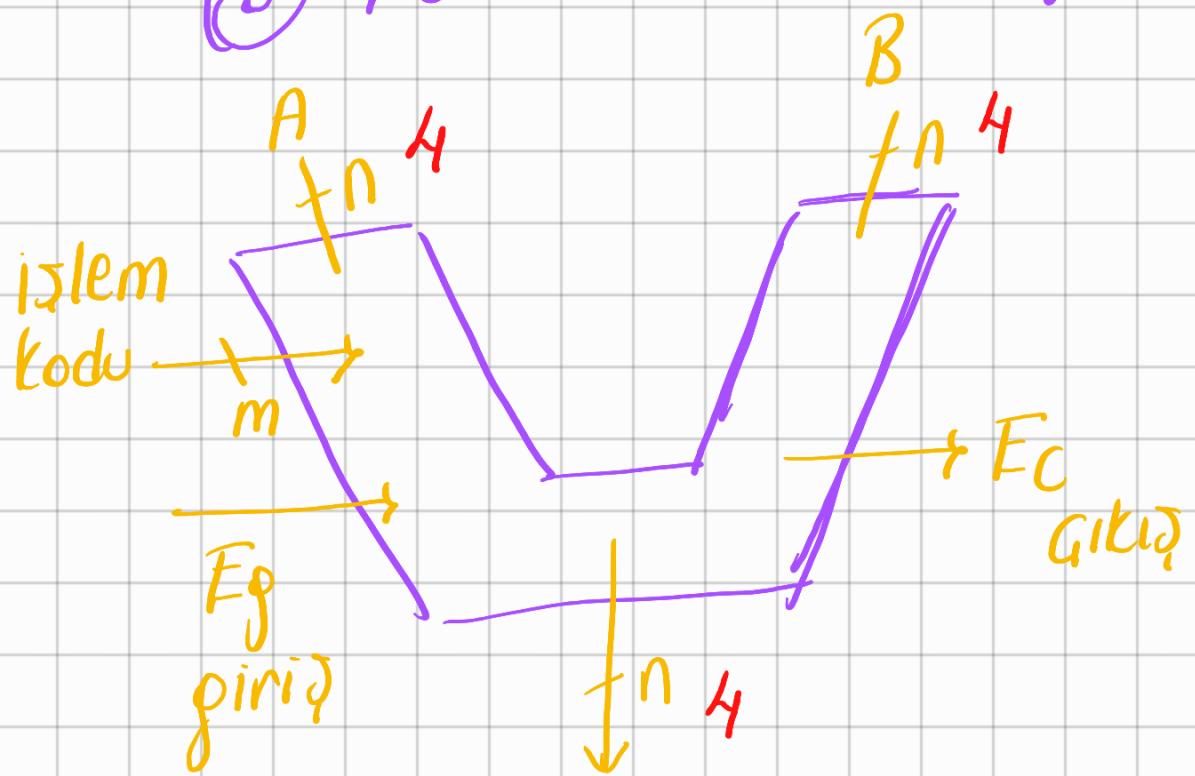
2^n girişler n çıkış



MSB
girişler | çıkışlar

$I_3 I_2 I_1 I_0$	$D_1 D_2$	Ready
0 0 0 0	0 0	0
0 0 0 1	0 0	1
0 0 1 0	0 1	1
0 1 0 0	1 0	1
1 0 0 0	1 1	1

⑥ ALU (Arithmetic logic UNIT)



F (Devrenin genel çıkışı)

