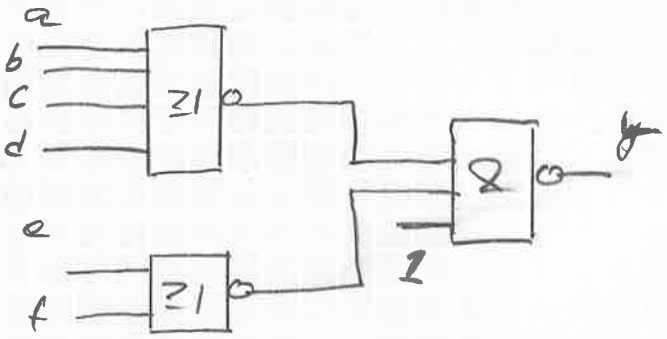
1)

$$y = a+b+c+d+e+f = \overline{\overline{a+b+c+d+e+f}} = \overline{\overline{a+b+c+d}\cdot\overline{e+f}}$$



(8p)

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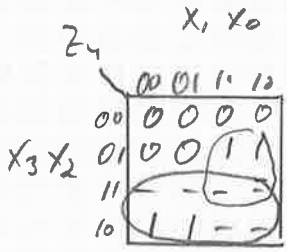
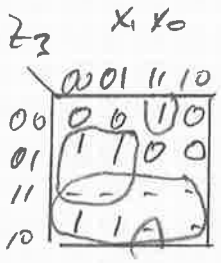
2)

	16 8 4 2 1
$X_3 X_2 X_1 X_0$	$Z_4 Z_3 Z_2 Z_1 Z_0$
0 0 0 0	0 0 0 0 0
0 0 0 1	0 0 0 1 1
0 0 1 0	0 0 1 1 0
0 0 1 1	0 1 0 0 1
0 1 0 0	0 1 1 0 0
0 1 0 1	0 1 1 1 1
0 1 1 0	1 0 0 1 0
0 1 1 1	1 0 1 0 1
1 0 0 0	1 1 0 0 0
1 0 0 1	1 1 0 1 1

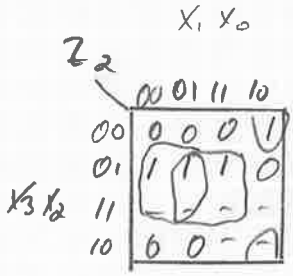
un tabell $\Rightarrow Z_0 = X_0$

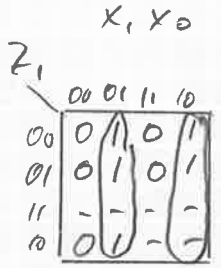


$Z_4 = X_3 + X_2 \cdot X_1$



$Z_4 = X_3 + X_2 \cdot \overline{X_1} + \overline{X_2} \cdot X_1 X_0$





$$Z_2 = X_2 \cdot \overline{X_1} + X_2 \cdot X_0 + X_2 \cdot X_1 \cdot \overline{X_0}$$

$$Z_1 = \overline{X_1} \cdot X_0 + X_1 \cdot \overline{X_0} = X_1 \oplus X_0$$

(8p)

3)

a) $89_{10} = 64 + 16 + 8 + 1 = 1011001_2$

Svar: 1011001_2

b) $101|1001_2 = 59_{16}$ Svar: 59_{16}

c) $1|011|001 = 131_8$ Svar: 131_8

d) $1|01|10|01 = 1121_4$ Svar: 1121_4

e) $-01011001_2 = 10100110 + 1 = 10100111$ Svar: 10100111

e) $80 = 64+16 = 01010000_2$

$80 - 89 \Rightarrow 01010000_2 - 10100111_2 \Rightarrow$

$$\begin{array}{r} 01010000 \\ 10100111 \\ \hline 11110111 \end{array}$$

negativt $\Rightarrow$ $00001000 + 1 = 00001001_2$

$00001001_2 = 9_{10}$ Svar: -9_{10}

f) $N_{max} = 2^{31} - 1$ (jmfr: 4-bitar $\Rightarrow 2^3 - 1 = 7$)

g) $N_{min} = -2^{31}$ (jmfr: 4-bitar $\Rightarrow -2^3 = -8$)

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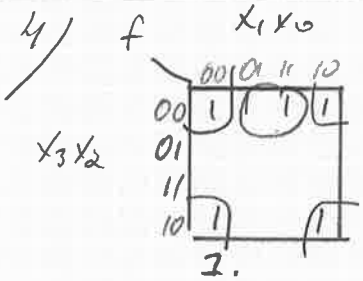
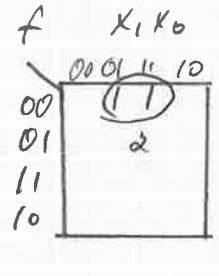
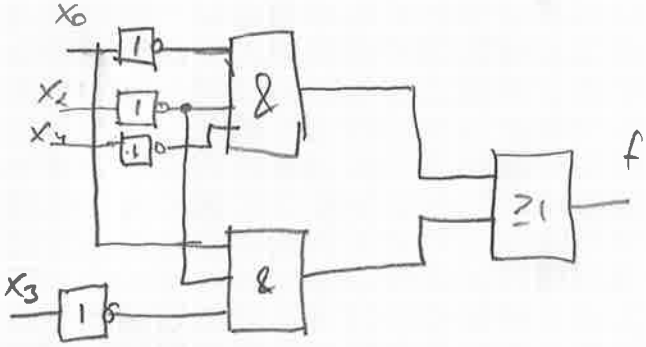
4)





$f = \overline{x_4} \cdot \overline{x_2} \cdot \overline{x_0} + \overline{x_3} \cdot \overline{x_2}\, x_0$



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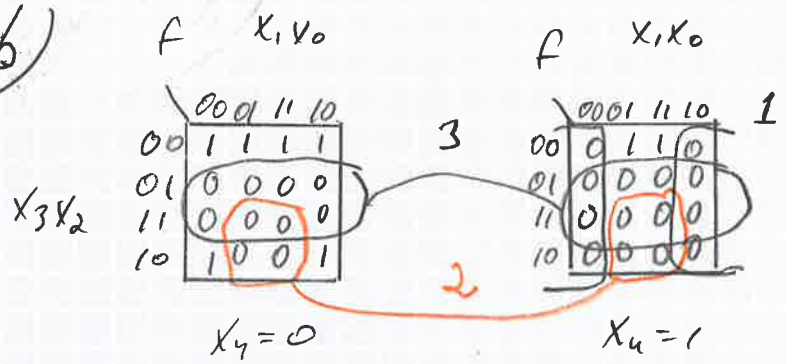
4) b)

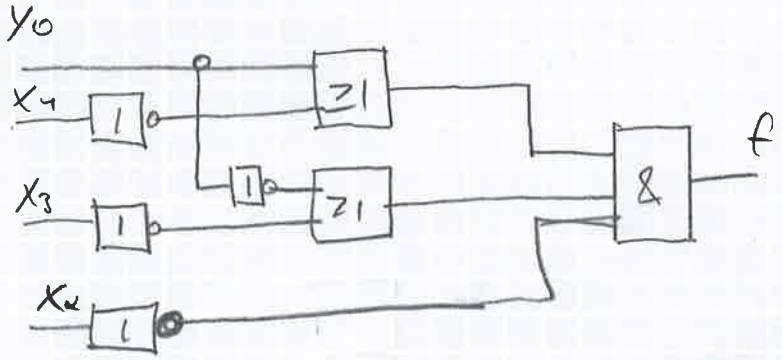


$$\overline{f} = x_4 \cdot \overline{x_0} + x_3 \cdot x_0 + x_2$$

$$f = \overline{\overline{f}} = \overline{x_4 \cdot \overline{x_0} + x_3 \cdot x_0 + x_2} = \overline{x_4 \cdot \overline{x_0}} \cdot \overline{x_3 \, x_0} \cdot \overline{x_2} =$$

(de Morgan) (de Morgan)

$$= \left(\overline{x_4} + x_0\right) \cdot \left(\overline{x_3} + \overline{x_0}\right) \cdot \overline{x_2}$$



(7p)

(8p)

5)

Nästa tillstånd $x_1 x_0$

Nuv.	00	01	10	11	u
S0	S0	S1	S0	S0	0001
S1	S2	S1	S0	S1	0010
S2	S2	S2	S3	S2	0100
S3	S0	S1	S3	S3	1000

$q_1^+ q_0^+$ $x_1 x_0$

$q_1 q_0$	00	01	10	11	u_3 u_2 u_1 u_0
00	00	01	00	00	0001
01	10	01	00	01	0010
10	10	10	11	10	0100
11	00	01	11	11	1000

q_1^+ $x_1 x_0$

$q_1 q_0$	00	01	11	10
00	0	0	0	0
01	1	0	0	
11	0	0	1	1
10		1	1	1

q_0^+ $x_1 x_0$

$q_1 q_0$	00	01	11	10
00	0	1	0	0
01	0	1	1	0
11	0	1	1	
10	0	0	0	1

$$q_1^+ = q_1 \cdot \overline{q_0} + \overline{q_1} \cdot x_0 + \overline{q_1} \cdot q_0 \cdot \overline{x_1} \cdot \overline{x_0}$$

$$q_1^+ = q_0 \cdot x_0 + \overline{q_1} \cdot \overline{x_1} \cdot x_0 + q_1 \cdot x_1 \cdot \overline{x_0}$$

$u_0 = \overline{q_1} \cdot \overline{q_0}$

$u_1 = \overline{q_1} \cdot q_0$

$u_2 = q_1 \cdot \overline{q_0}$

$u_3 = q_1 \cdot q_0$

(7p)

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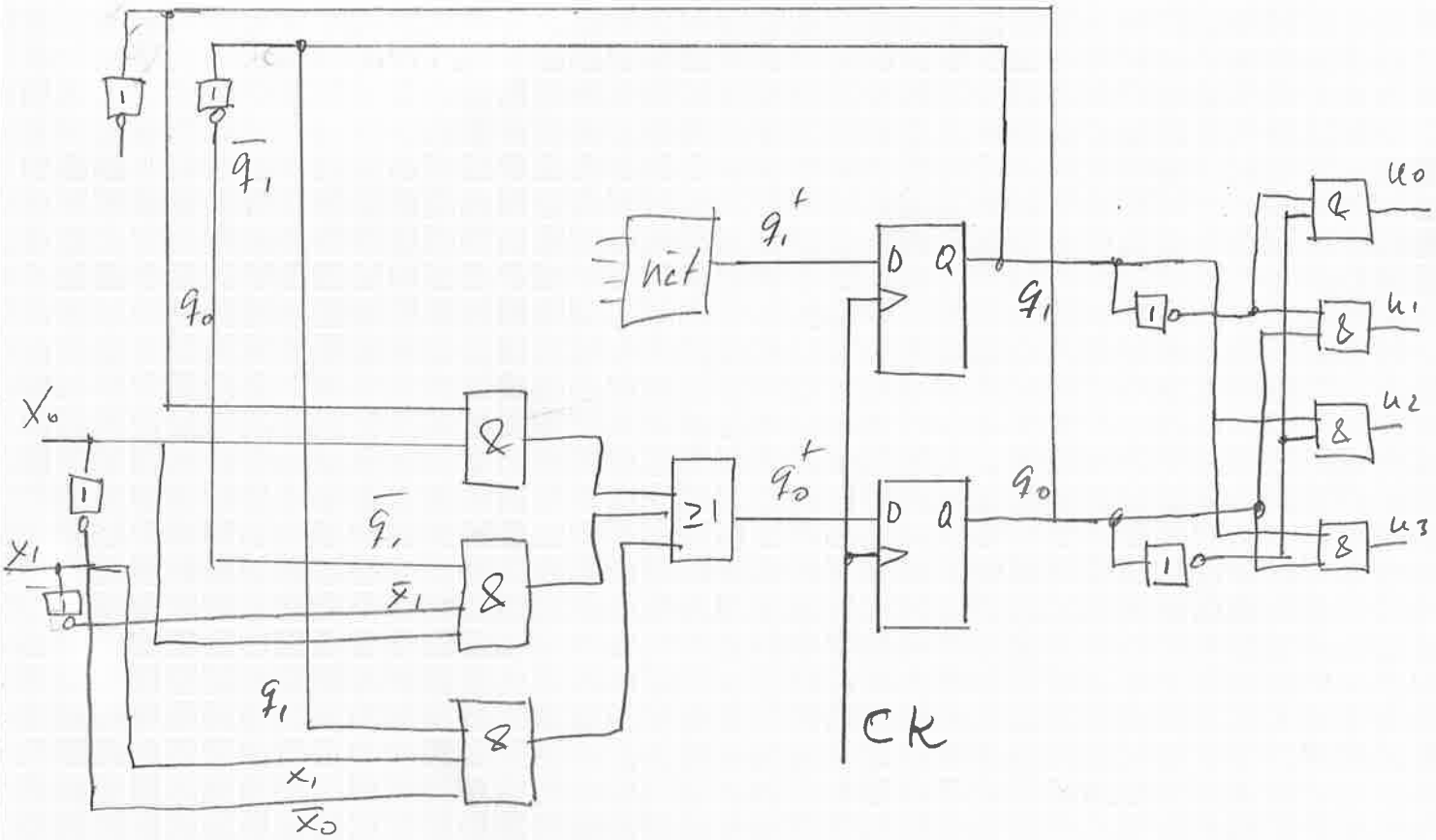
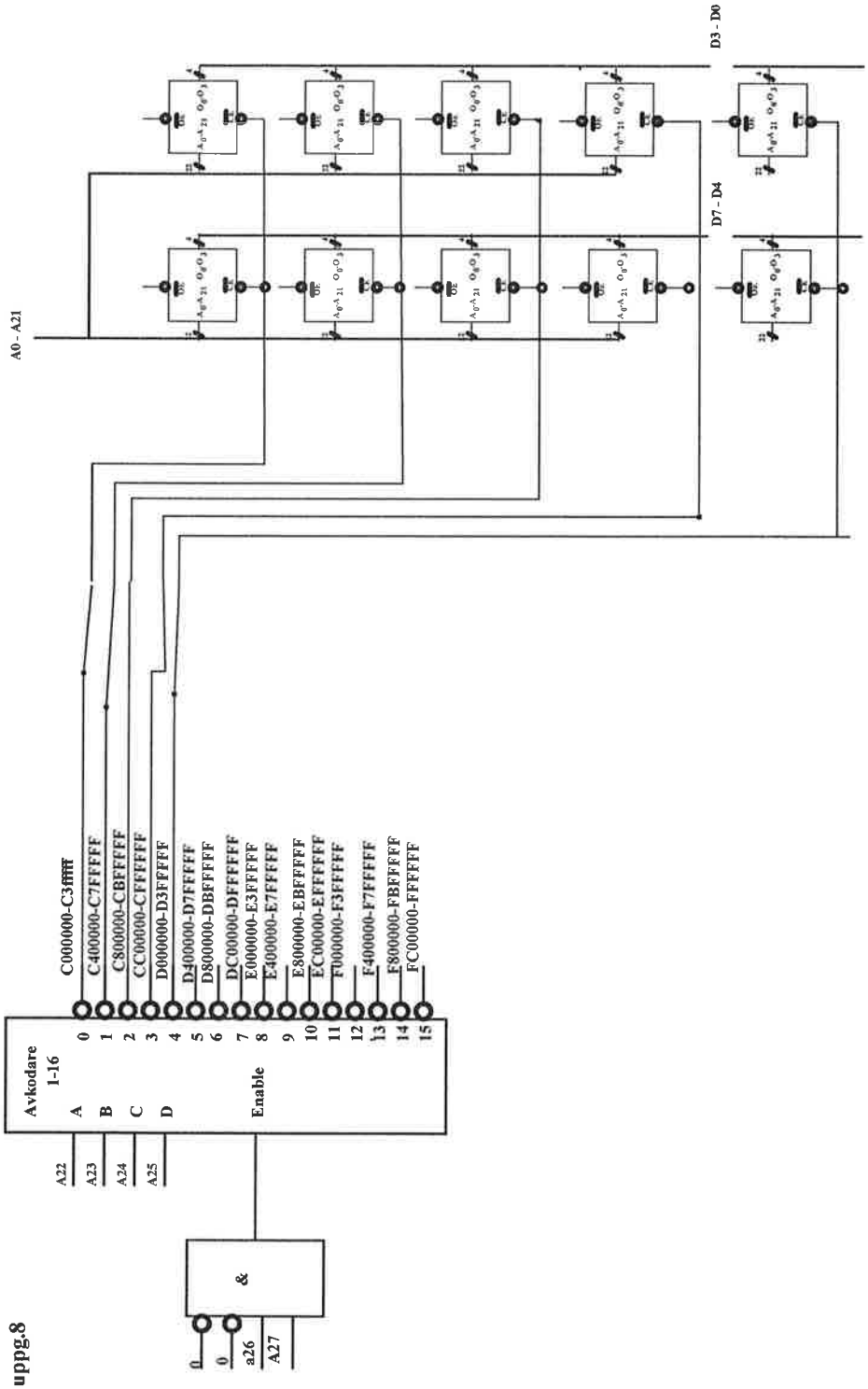
4.



uppg.8


Avkodare
1-16
A
B
C
D
Enable
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
C000000-C3ffffff
C400000-C7FFFFF
C800000-CBFFFFF
CC00000-CFFFFFF
D000000-D3FFFFF
D400000-D7FFFFF
D800000-DBFFFFF
DC00000-DFFFFFF
E000000-E3FFFFF
E400000-E7FFFFF
E800000-EBFFFFF
EC00000-EFFFFFF
F000000-F3FFFFF
F400000-F7FFFFF
F800000-FBFFFFF
FC00000-FFFFFF
A22
A23
A24
A25
&
0
0
a26
A27
A0 - A21
D7 - D4
D3 - D0