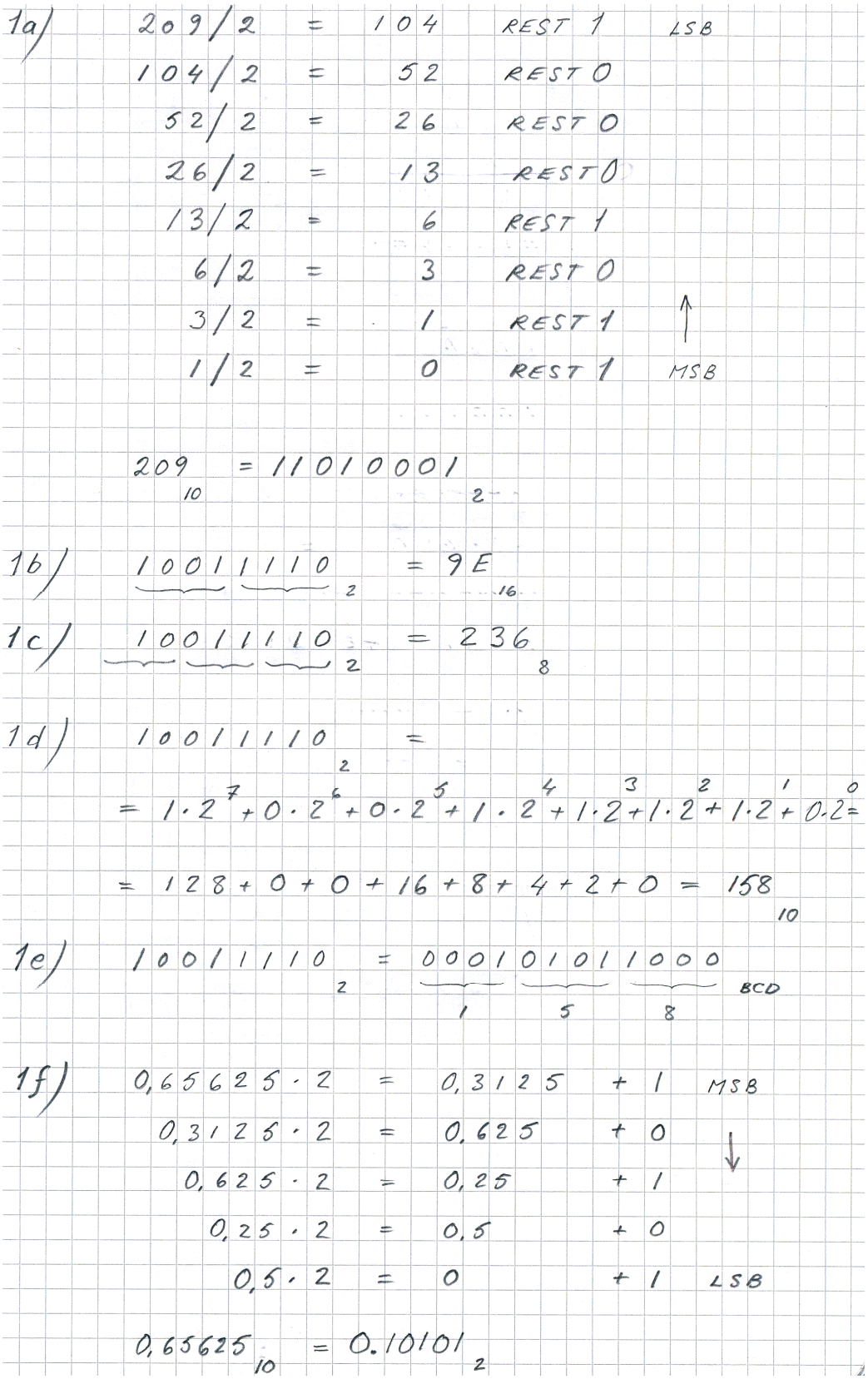
Lösningsförslag till tentamen ETE235 Digitalteknik 2012-06-19



1g)

$$-\begin{array}{r} 10011110^{10} \\ 1 \end{array}$$

$$10011101$$

$$01100010 = +98$$

$$_{2} \qquad _{10}$$

ALLTSÅ

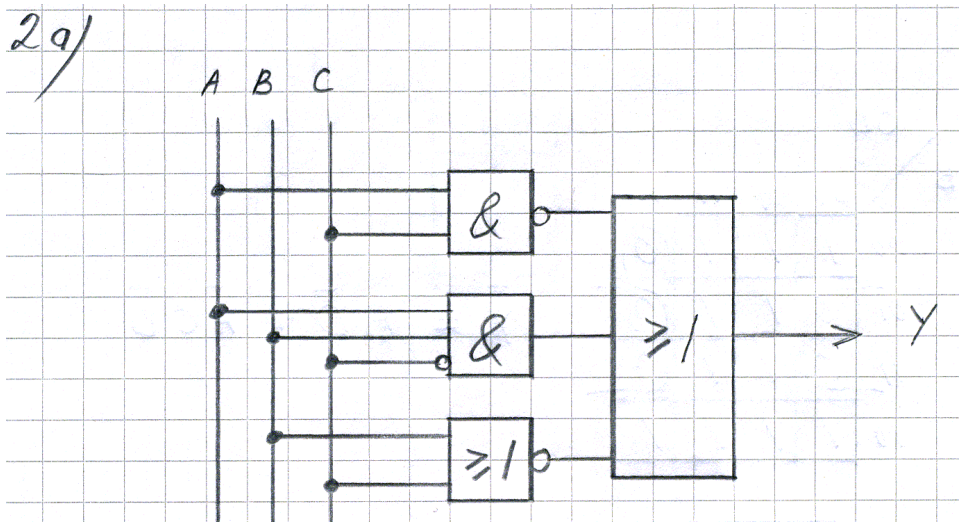
$$10011110 = -98$$

REPRESENTATION ENLIGT TVÅKOMPLEMENTMETODEN INNEBÄR ATT VÄNSTRA BITEN ÄR TECKENBIT.

0 = PLUS

1 = MINUS

2a)



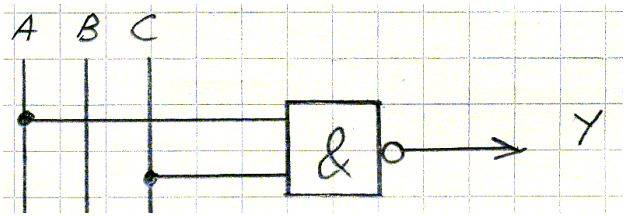
2b)

$$Y = \overline{AC} + AB\bar{C} + \left(\overline{B+C}\right) =$$

$$= \bar{A} + \bar{C} + AB\bar{C} + \bar{B}\bar{C} =$$

$$= \bar{A} + \bar{C}\left(1 + AB + \bar{B}\right) =$$

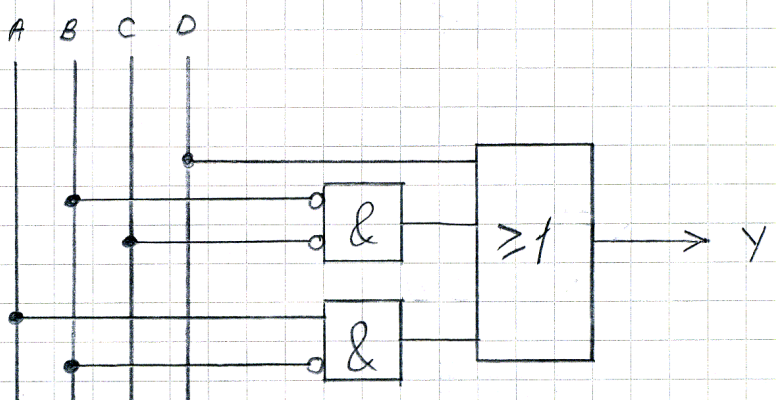
$$= \bar{A} + \bar{C} = \overline{AC}$$



3a/

AB \ CD	00	01	11	10
00	1	1	1	0
01	0	1	1	0
11	0	1	1	0
10	1	1	1	1

$$Y = D + \bar{B}\bar{C} + A\bar{B}$$

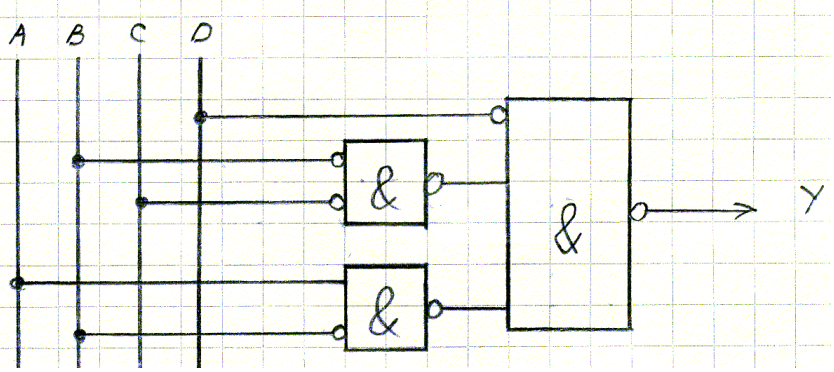


3b/

$$Y = D + \bar{B}\bar{C} + A\bar{B} =$$

$$= \overline{\overline{D + \bar{B}\bar{C} + A\bar{B}}} =$$

$$= \overline{\overline{D} \cdot \overline{\bar{B}\bar{C}} \cdot \overline{A\bar{B}}}$$



3 c)

AB \ CD	00	01	11	10
00	1	1	1	0
01	0	1	1	0
11	0	1	1	0
10	1	1	1	1

$$\bar{y} = B\bar{D} + \bar{A}C\bar{D}$$

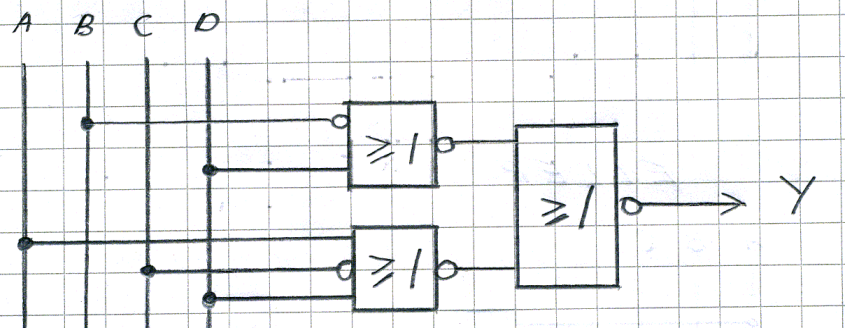
$$Y = \overline{B\bar{D} + \bar{A}C\bar{D}} =$$

$$= \overline{\overline{B\bar{D}} + \overline{\bar{A}C\bar{D}}} =$$

$$= \overline{\overline{B\bar{D}} \cdot \overline{\bar{A}C\bar{D}}} =$$

$$= \left(\overline{B + \bar{D}}\right) \cdot \left(\overline{\bar{A} + C + \bar{D}}\right)$$

$$= \overline{\left(\overline{B + D}\right)} + \overline{\left(\overline{A + \bar{C} + D}\right)}$$



4.

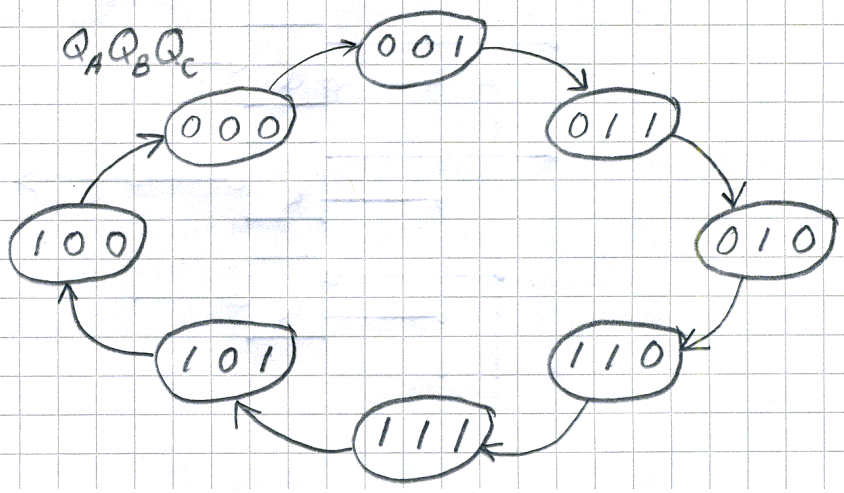
$$T = (Q_B \oplus Q_A) \cdot \bar{Q}_C$$

$$J = Q_C \cdot \bar{Q}_A$$

$$K = Q_A \cdot Q_C$$

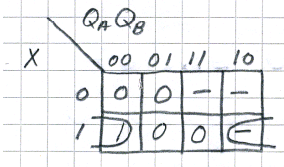
$$D = \overline{Q_B \oplus Q_A}$$

FÖRE CP						EFTER CP		
Q_A	Q_B	Q_C	T	J	K	D	Q_A^+	Q_B^+	Q_C^+
0	0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	1	0	1	1
0	1	0	1	0	0	0	1	1	0
0	1	1	0	1	0	0	0	1	0
1	0	0	1	0	0	0	0	0	0
1	0	1	0	0	1	0	1	0	0
1	1	0	0	0	0	1	1	1	1
1	1	1	0	0	1	1	1	0	1

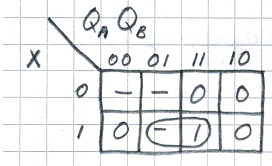


5. FÖRE CP — EFTER CP

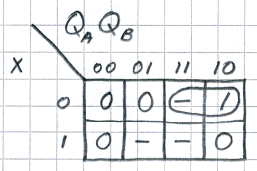
X	Q_A	Q_B	S_A	R_A	S_B	R_B	Q_A^+	Q_B^+
0	0	0	0	-	0	-	0	0
0	0	1	0	-	0	1	0	0
0	1	0	-	0	1	0	1	1
0	1	1	-	0	-	0	1	1
1	0	0	1	0	0	-	1	0
1	0	1	0	-	-	0	0	1
1	1	0	-	0	0	-	1	0
1	1	1	0	1	-	0	0	1



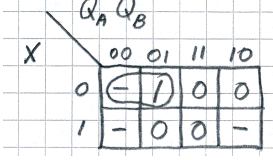
$S_A = X\bar{Q}_B$



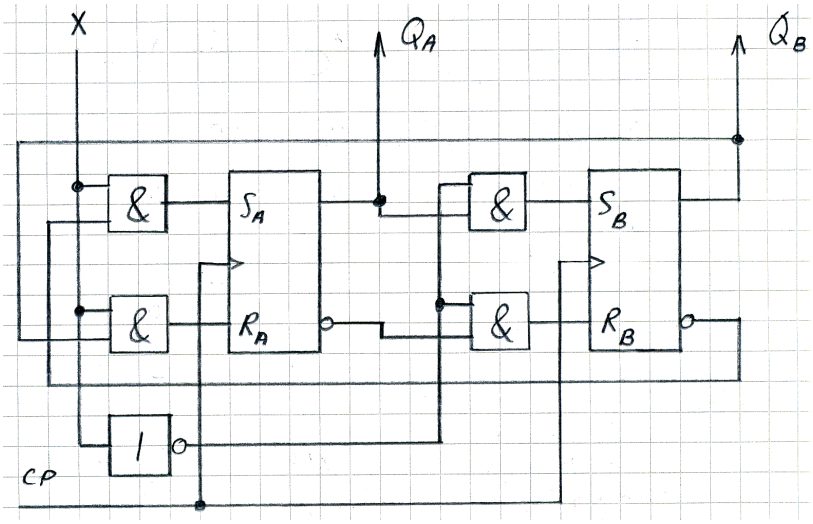
$R_A = XQ_B$



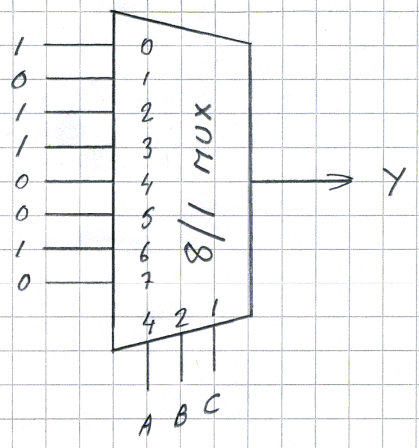
$S_B = \bar{X}Q_A$



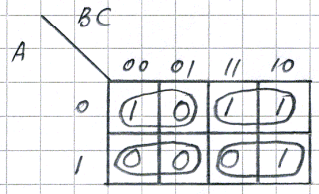
$R_B = \bar{X}\bar{Q}_A$



6a)



6b) ALT. 1. ANVÄND A OCH B SOM STYRSIGNALER



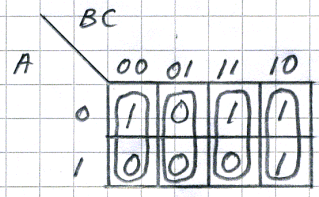
$AB = 00 \rightarrow Y = \bar{C}$

$AB = 01 \rightarrow Y = 1$

$AB = 10 \rightarrow Y = 0$

$AB = 11 \rightarrow Y = \bar{C}$

ALT. 2. ANVÄND B OCH C SOM STYRSIGNALER



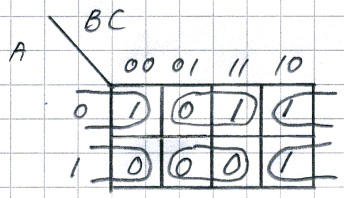
$BC = 00 \rightarrow Y = \bar{A}$

$BC = 01 \rightarrow Y = 0$

$BC = 10 \rightarrow Y = 1$

$BC = 11 \rightarrow Y = \bar{A}$

ALT. 3. ANVÄND A OCH C SOM STYRSIGNALER



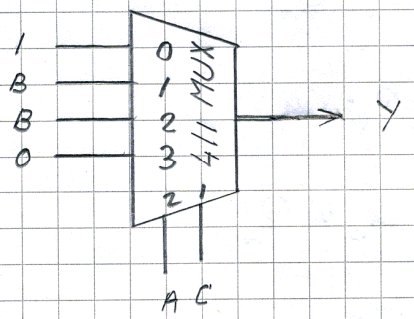
$AC = 00 \rightarrow Y = 1$

$AC = 01 \rightarrow Y = B$

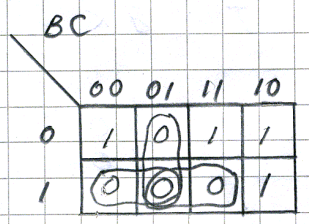
$AC = 10 \rightarrow Y = B$

$AC = 11 \rightarrow Y = 0$

ALLTSÅ, ALT. 3 GER EN LÖSNING UTAN INVERTERARE



6c)



$$\bar{Y} = A\bar{B} + AC + \bar{B}C$$

$$Y = \overline{A\bar{B} + AC + \bar{B}C} =$$

$$= \overline{A\bar{B}} \cdot \overline{AC} \cdot \overline{\bar{B}C}$$