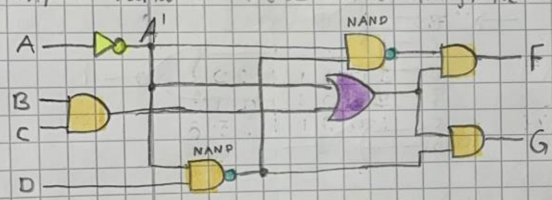
Dərmaskammtur 4

4.2 Obtain the simplified Boolean expression for output F and G in terms of the input variables in the circuit of Fig. P4.2



$F = (\overline{\bar{A} D})(\overline{\bar{A}})(\bar{A} + BC) = (A + \bar{D})(A)(\bar{A} + BC)$

$= (AA + A\bar{D})(\bar{A} + BC)$

$= (A + A\bar{D})(\bar{A} + BC)$

$= (A\bar{A} + ABC + A\bar{A}D + ABC\bar{D})$

$= 0 + ABC + 0 + ABC\bar{D}$

$= ABC + ABC\bar{D}$

1 1 1 0/1   1 1 1 0

AB \ CD	00	01	11	10
00	0 [0]	0 [1]	0 [3]	0 [2]
01	0 [4]	0 [5]	0 [7]	0 [6]
11	0 [12]	0 [13]	1 [15]	1 [14]
10	0 [8]	0 [9]	0 [11]	0 [10]

$G = \underline{ABC}$

$G = (\overline{\bar{A} D})(\bar{A} + BC)$

$= (A + D)(\bar{A} + BC)$

$= \cancel{A\bar{A}} + ABC + \bar{A}D + BCD$

$= ABC + \bar{A}D + BCD$

ABC_ + Ā__D + _BCD

14 1110	7 0111	7 0111
15 1111	1 0001	15 1111
	5 0101	
	6 0011	

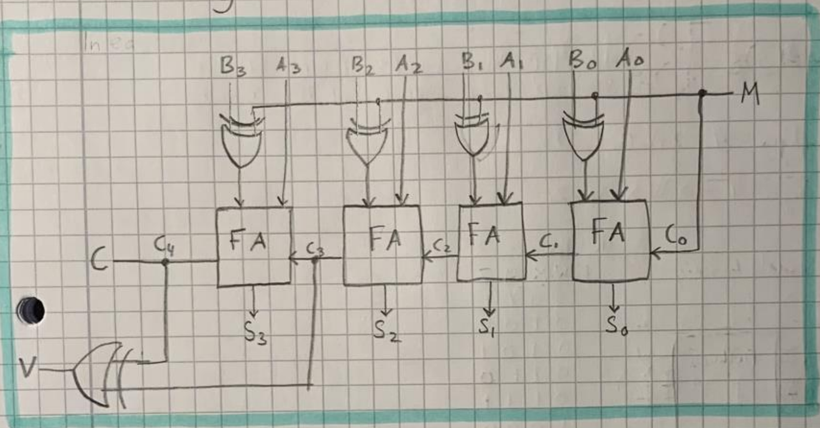
AB \ CD	00	01	11	10
00	m0 0	m1 1	m3 0	m2 0
01	m4 0	m5 1	m7 1	m6 1
11	m12 0	m13 0	m15 1	m14 1
10	m8 0	m9 0	m11 0	m10 0

$F = \bar{A}\bar{C}D + BC$

4.13 The adder-subtractor circuit of Fig 4.13 has the following values for mode input M and data inputs A and B.

	M	A	B
a)	0	0111	0110
b)	0	1000	1001
c)	1	1100	1000
d)	1	0101	1010
e)	1	0000	0001

In each case, determine the values of the four SUM outputs, the carry C, and overflow V.



SUM(A ⊗ B)

NB = FA = Full-Adder

$V_{MAX} = (8)\ 1000$

$S = A \otimes B$

$C = AB$

a)

$$\begin{array}{r} 1\ 1\ \ \ \ \\ 0\ 1\ 1\ 1 \\ +\ 0\ 1\ 1\ 0 \\ \hline 1\ 1\ 0\ 1 \end{array}$$

C = 0
V = 1

b)

$$\begin{array}{r} 1\ 0\ 0\ 0 \\ +\ 1\ 0\ 0\ 1 \\ \hline 1\ \boxed{0\ 0\ 0\ 1} \end{array}$$

C = 1
V = 0

c)

$$\begin{array}{r} 1\ 1\ 0\ 0 \\ +\ 1\ 0\ 0\ 0 \\ \hline 1\ \boxed{0\ 1\ 0\ 0} \end{array}$$

C = 1
V = 0

d)

$$\begin{array}{r} 0\ 1\ 0\ 1 \\ +\ 1\ 0\ 1\ 0 \\ \hline 1\ 1\ 1\ 1 \end{array}$$

C = 0
V = 1

e)

$$\begin{array}{r} 0\ 0\ 0\ 0 \\ +\ 0\ 0\ 0\ 1 \\ \hline 0\ 0\ 0\ 1 \end{array}$$

C = 0
V = 0

$$\begin{array}{r} 0\ 1\ 1\ 0\ 0\ 0\ 1\ \ \\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1 \\ 0\ 0\ 0\ 1\ 1\ 0\ 0\ 1 \\ \hline 0\ 1\ 0\ 0\ 1\ 1\ 1\ 0 \end{array}$$

C = 0
V = 0

Dec

$$\begin{array}{r} 53 \\ +\ 91 \\ \hline 144 \end{array}$$

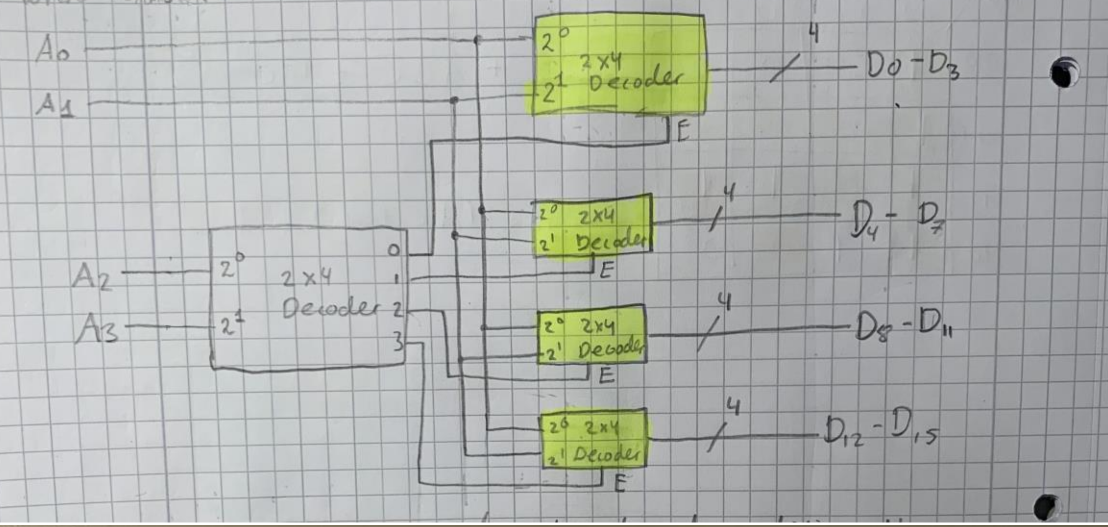
$$\begin{array}{r} 1\ 1\ 1\ 1\ 1\ 1\ 1\ \ \\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1 \\ 0\ 1\ 0\ 1\ 1\ 0\ 1\ 1 \\ \hline 1\ 0\ 0\ 1\ 0\ 0\ 0\ 0 \end{array}$$

C = 0
V = 1

Thinking signed we added two positive numbers.

$$\begin{array}{r} 1\ 1\ \ \ \ \\ 0\ 1\ 1\ 0 \\ +\ 0\ 0\ 1\ 0 \\ \hline 1\ 0\ 0\ 0 \end{array}$$

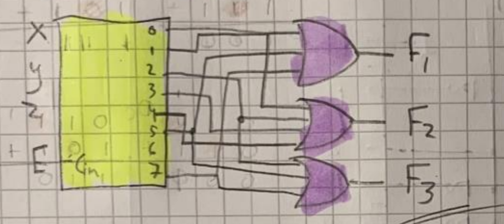
4.26 Construct a 4-to-16-line decoder with 2-to-4-line decoders with enable.



4.28 b) $F_1 = (\bar y + x)z = \bar y z + xz = \bar y z(x+\bar x) + xz(y+\bar y) = x\bar y z + \bar x \bar y z + xyz + x\bar y z \} \Sigma(1,5,7)$

$F_2 = \bar y \bar z + \bar x y + y \bar z = \Sigma(0,2,3,4,6)$

$F_3 = (x+y)z = xz + yz = x(y+\bar y)z + (x+\bar x)yz = x'y'z' + x\bar y z + xyz + \bar x y z \} \Sigma(2,5,7)$



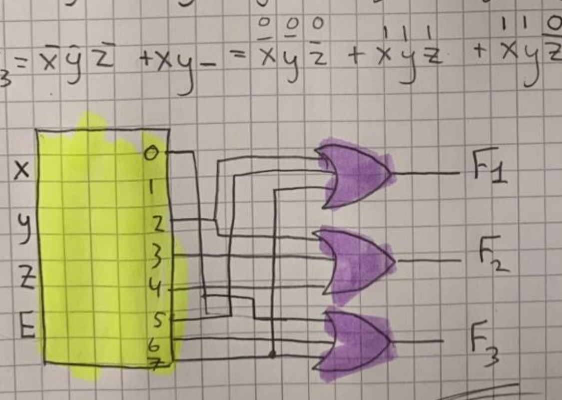
4.28

a) $F_1 = \bar x y \bar z + xz = \bar x y \bar z + xyz = 010 + 111$

$\bar x y \bar z + x \bar y z = 010 + 101 \} \Sigma(2,5,7)$

$F_2 = x\bar y \bar z + \bar x y = x\bar y \bar z + \bar x y z + \bar x y \bar z \} \Sigma(2,3,4)$

$F_3 = \bar x \bar y \bar z + xy = \bar x \bar y \bar z + xyz + xy\bar z \} \Sigma(0,6,7)$



4.A1

	A	B	C	D	F	
0	0	0	0	0	1	F = 1
	0	0	0	1	1	
1	0	0	1	0	1	$F = \overline{D}$
	0	0	1	1	0	
2	0	1	0	0	0	F = D
	0	1	0	1	1	
3	0	1	1	0	1	$F = \overline{D}$
	0	1	1	1	0	
4	1	0	0	0	1	$F = \overline{D}$
	1	0	0	1	0	
5	1	0	1	0	0	F = 0
	1	0	1	1	0	
6	1	1	0	0	1	F = 1
	1	1	0	1	1	
7	1	1	1	0	0	F = D
	1	1	1	1	1