Solutions
Prob. Set 4
P116B W05

Some solutions from Instructor's Manual for Bobrow, © Oxford University Press

11.33 (the text solution considers $\overline{(A\overline{B}+\overline{A}B)(\overline{A}B)} = A+B$)

But the actual problem was

$$\overline{(A\overline{B}+\overline{A}B)(\overline{A}B)} = \overline{A\overline{B}}+\overline{\overline{A}B}+\overline{(\overline{A}B)} \quad \text{(de Morgan)}$$

$$= \overline{A}\overline{B}+\overline{A}\overline{B}+A+\overline{B} \quad (\text{''})$$

$$=(\overline{A}\overline{B}+\overline{B})+(A+\overline{A}\overline{B}) \quad \text{(rearrange)}$$

$$=\overline{B}+\underbrace{(A+\overline{A})}_{1}(A+\overline{B}) \quad \text{(absorption, distrib. law)}$$

$$=\underbrace{\overline{B}+B}_{1}+A = \underline{1}.$$

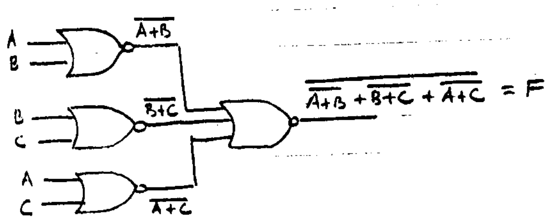
11.37

$AB+\overline{A}\overline{C} = (AB+AB\overline{C})+(\overline{A}\overline{C}+\overline{A}\overline{C}B)$	since $A=A+AB$
$= (AB+\overline{A}\overline{C})+(AB\overline{C}+\overline{A}B\overline{C})$	commutative laws
$= AB+\overline{A}\overline{C}+(A+\overline{A})B\overline{C}$	distributive & comm.
$= AB+\overline{A}\overline{C}+B\overline{C}$	$A+\overline{A}=1$, $1\cdot A=A$
$= \overline{A}\overline{C}+AB+B\overline{C}$	commutative law
$= \overline{A}A+\overline{A}\overline{C}+AB+B\overline{C}$	since $\overline{A}A=0$
$= \overline{A}(A+\overline{C})+B(A+\overline{C})$	distributive law
$= (\overline{A}+B)(A+\overline{C})$	distributive law

11.46

A B C	A+B	B+C	A+C	F = (A+B)(B+C)(A+C)
0 0 0	0	0	0	0
0 0 1	0	1	1	0
0 1 0	1	1	0	0
0 1 1	1	1	1	1
1 0 0	1	0	1	0
1 0 1	1	1	1	1
1 1 0	1	1	1	1
1 1 1	1	1	1	1

$$F = \overline{\overline{(A+B)(B+C)(A+C)}} = \overline{\overline{A+B}+\overline{B+C}+\overline{A+C}}$$



11.51

(a)

A \ BC	00	01	11	10
0		1		1
1	1		1	

$F = \overline{A}\overline{B}C+\overline{A}B\overline{C}+A\overline{B}\overline{C}+ABC$

Cannot be simplified

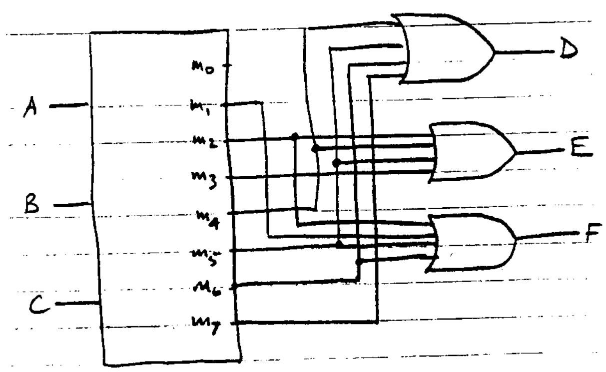
12.17

A B C	D E F
0 0 0	0 0 0
0 0 1	0 0 1
0 1 0	0 1 1
0 1 1	0 1 0
1 0 0	1 1 0
1 0 1	1 1 1
1 1 0	1 0 1
1 1 1	1 0 0

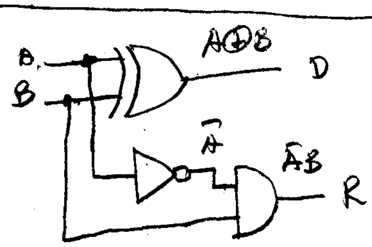
$D = m_4+m_5+m_6+m_7$

$E = m_2+m_3+m_4+m_5$

$F = m_1+m_2+m_5+m_6$



12.3 $D = A \oplus B$, $R = \overline{A}B$



12.22

$F = \overline{A}\overline{B}I_0+\overline{A}BI_1+A\overline{B}I_2+ABI_3$

$= \overline{A}\overline{B}(0)+\overline{A}B\overline{C}+A\overline{B}C+AB(1)$

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

$= \overline{A}B\overline{C}+A(\overline{B}C+B)$

$= \overline{A}B\overline{C}+A(B+C)$

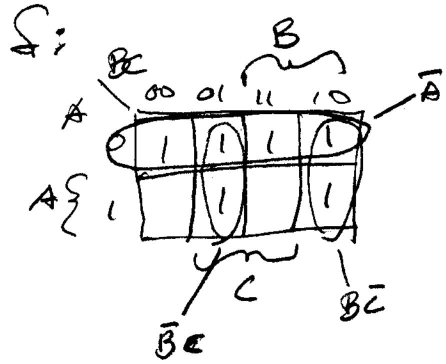
$= \overline{A}B\overline{C}+AB+AC$

$= (A+\overline{C})B+AC$

$= AB+AC+B\overline{C}$

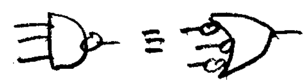
11.53(c)

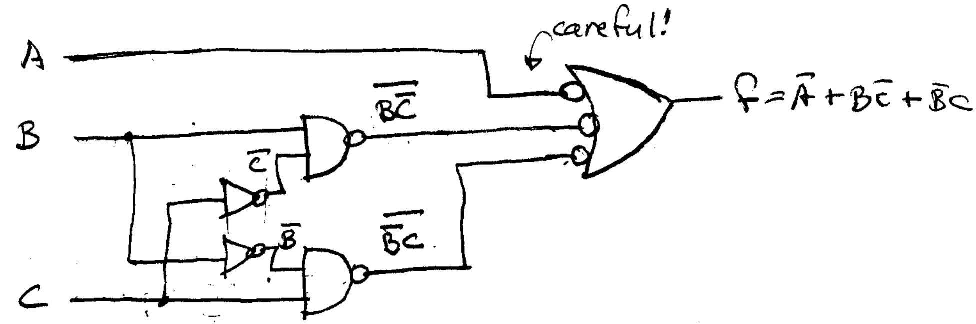
f:



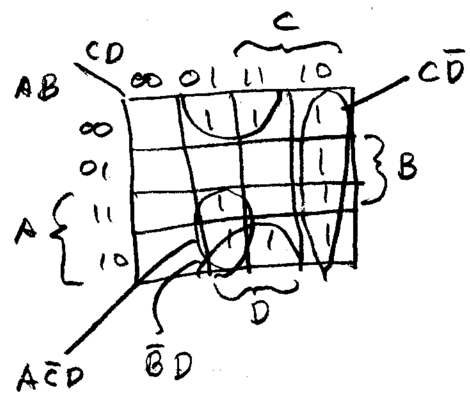
$f = \bar{A} + \bar{B}C + B\bar{C}$

- Implement with two-stage logic using NANDS & Inverters.

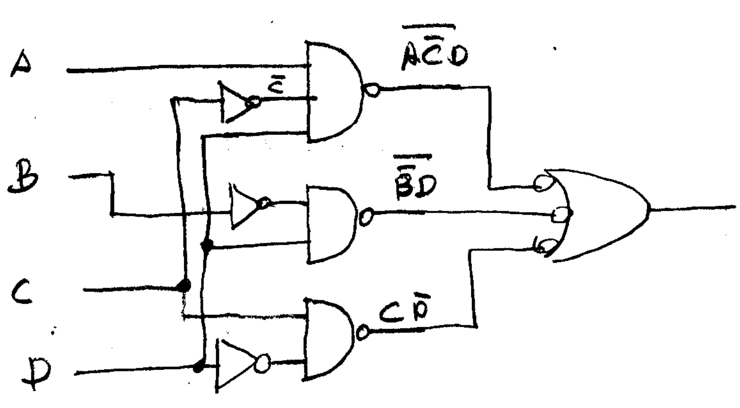
[Note  $\overline{ABC} = \bar{A} + \bar{B} + \bar{C}$ (de Morgan)]



11.57(b)



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



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