

Practice Problems V

①

(a)

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
AB	12	13	15	14
$A\bar{B}$	8	9	11	10

* Essential Prime Implicant: $\bar{C}, A, \bar{B}, \bar{D}$

* Prime Implicant: $\bar{C}, A, \bar{B}, \bar{D}$

(b)

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
AB	12	13	15	14
$A\bar{B}$	8	9	11	10

* Essential prime Implicant: $\bar{A}B, \bar{B}\bar{C}D, \bar{A}B\bar{C}$

* prime Implicant: $\bar{A}B, \bar{B}\bar{C}D, \bar{A}B\bar{C}, \bar{A}\bar{C}D, \bar{A}\bar{B}D$

(c)

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
AB	12	13	15	14
$A\bar{B}$	8	9	11	10

* Essential Prime Implicant: $\bar{A}\bar{C}, \bar{A}B\bar{D}, \bar{A}B\bar{C}$

* Prime Implicant: $\bar{A}\bar{C}, \bar{A}B\bar{D}, \bar{A}B\bar{C}$

(2)

AB \ CD	$\bar{C}\bar{D}$	$\bar{C}D$	$C\bar{D}$	CD
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
AB	8	9	11	10
$A\bar{B}$	12	13	15	14

* Essential prime Implicant: $AB, B\bar{C}, ACD$

* Prime Implicant: $AB, B\bar{C}, ACD$

(e)

WX \ YZ	$\bar{Y}\bar{Z}$	$\bar{Y}Z$	YZ	$Y\bar{Z}$
$\bar{W}\bar{X}$	0	1	3	2
$\bar{W}X$	4	5	7	6
WX	8	9	11	10
$W\bar{X}$	12	13	15	14

* Essential prime Implicant: $\bar{W}X, \bar{X}\bar{Y}Z, W\bar{X}Y$

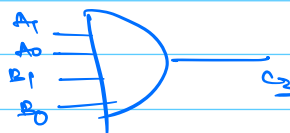
* prime Implicants: $\bar{W}X, \bar{X}\bar{Y}Z, W\bar{X}Y, \bar{W}\bar{Y}Z, W\bar{X}Z$

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(2)

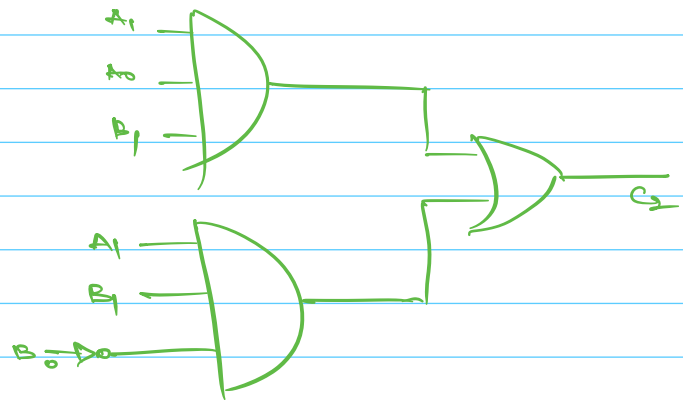
A_1A_0 \ B_1B_0	$\bar{B}_1\bar{B}_0$	\bar{B}_1B_0	$B_1\bar{B}_0$	B_1B_0
$\bar{A}_1\bar{A}_0$	0	1	3	2
\bar{A}_1A_0	4	5	7	6
$A_1\bar{A}_0$	8	9	11	10
A_1A_0	12	13	15	14

$$C_3 = A_1A_0B_1B_0$$



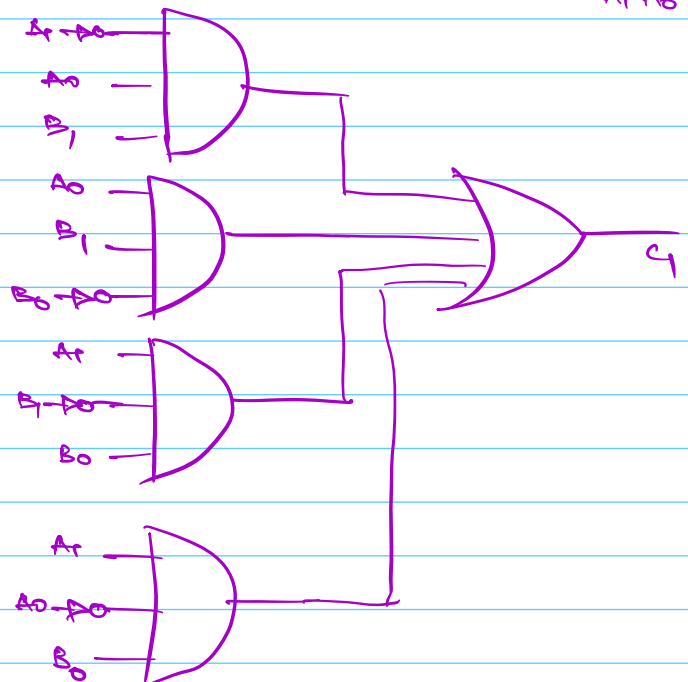
$A_1 A_0 \backslash B_1 B_0$	$\overline{B_1} \overline{B_0}$	$\overline{B_1} B_0$	$B_1 \overline{B_0}$	$B_1 B_0$
$\overline{A_1} \overline{A_0}$	0	0	0	0
$\overline{A_1} A_0$	0	0	0	0
$A_1 \overline{A_0}$	0	0	1	1
$A_1 A_0$	0	0	0	1

$$C_2 = A_1 A_0 B_1 + A_1 B_1 \overline{B_0}$$



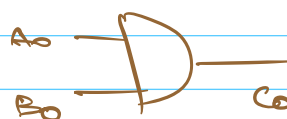
$A_1 A_0 \backslash B_1 B_0$	$\overline{B_1} \overline{B_0}$	$\overline{B_1} B_0$	$B_1 \overline{B_0}$	$B_1 B_0$
$\overline{A_1} \overline{A_0}$	0	0	0	0
$\overline{A_1} A_0$	0	0	1	1
$A_1 \overline{A_0}$	1	0	0	1
$A_1 A_0$	1	1	1	0

$$C_1 = \overline{A_1} A_0 B_1 + A_0 B_1 \overline{B_0} + A_1 \overline{B_1} B_0 + A_1 \overline{A_0} B_0$$



$A_1 A_0 \backslash B_1 B_0$	$\overline{B_1} \overline{B_0}$	$\overline{B_1} B_0$	$B_1 \overline{B_0}$	$B_1 B_0$
$\overline{A_1} \overline{A_0}$	0	0	0	0
$\overline{A_1} A_0$	0	1	1	0
$A_1 \overline{A_0}$	0	1	1	0
$A_1 A_0$	0	0	0	0

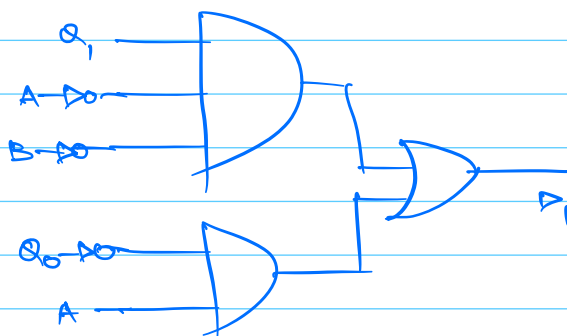
$$C_0 = A_0 \cdot B_0$$



3

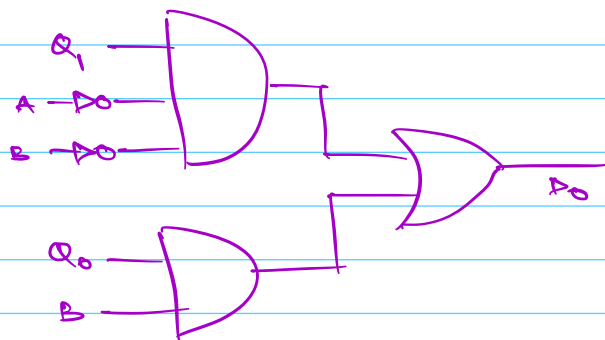
$Q_1 Q_0$ \ AB	$\bar{A}\bar{B}$	$\bar{A}B$	AB	$A\bar{B}$
$\bar{Q}_1 \bar{Q}_0$	0	0	X	1
$\bar{Q}_1 Q_0$	0	0	X	0
$Q_1 \bar{Q}_0$	1	0	X	0
$Q_1 Q_0$	1	0	X	1

$$D_1 = Q_1 \bar{A} \bar{B} + \bar{Q}_0 A$$



$Q_1 Q_0$ \ AB	$\bar{A}\bar{B}$	$\bar{A}B$	AB	$A\bar{B}$
$\bar{Q}_1 \bar{Q}_0$	0	0	X	0
$\bar{Q}_1 Q_0$	0	1	X	0
$Q_1 \bar{Q}_0$	1	1	X	0
$Q_1 Q_0$	1	0	X	0

$$D_0 = Q_1 \bar{A} \bar{B} + Q_0 \cdot B$$



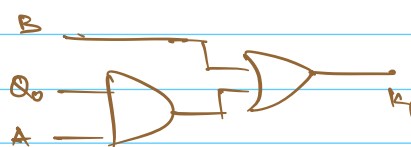
$Q_1 Q_0$ \ AB	$\bar{A}\bar{B}$	$\bar{A}B$	AB	$A\bar{B}$
$\bar{Q}_1 \bar{Q}_0$	0	0	X	1
$\bar{Q}_1 Q_0$	0	0	X	0
$Q_1 \bar{Q}_0$	X	X	X	X
$Q_1 Q_0$	X	X	X	X

$$J_1 = \bar{Q}_0 A$$



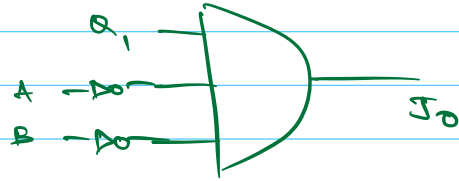
$Q_1 Q_0$ \ AB	$\bar{A}\bar{B}$	$\bar{A}B$	AB	$A\bar{B}$
$\bar{Q}_1 \bar{Q}_0$	X	X	X	X
$\bar{Q}_1 Q_0$	X	X	X	X
$Q_1 \bar{Q}_0$	0	1	X	1
$Q_1 Q_0$	0	1	X	0

$$K_1 = B + Q_0 \cdot A$$



$Q_1 Q_0 \backslash AB$	$\overline{A}\overline{B}$	$\overline{A}B$	$A\overline{B}$	AB
$\overline{Q_1}\overline{Q_0}$	0 ₀	0 ₁	X ₃	0 ₂
$\overline{Q_1}Q_0$	X ₄	X ₅	X ₇	X ₆
$Q_1\overline{Q_0}$	X ₁₁	X ₁₀	X ₁₅	X ₁₄
Q_1Q_0	1 ₈	0 ₉	X ₁₃	0 ₁₂

$$J_0 = Q_1 \overline{A} \overline{B}$$



$Q_1 Q_0 \backslash AB$	$\overline{A}\overline{B}$	$\overline{A}B$	$A\overline{B}$	AB
$\overline{Q_1}\overline{Q_0}$	X ₀	X ₁	X ₃	X ₂
$\overline{Q_1}Q_0$	1 ₄	0 ₅	X ₇	1 ₆
$Q_1\overline{Q_0}$	0 ₁₂	0 ₁₁	X ₁₅	1 ₁₄
Q_1Q_0	X ₈	X ₉	X ₁₃	X ₁₀

$$K_0 = \overline{Q_1} \overline{B} + A$$

