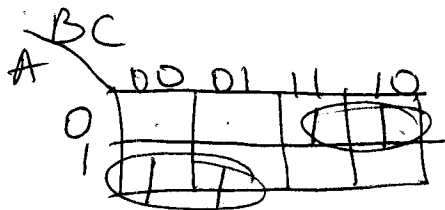


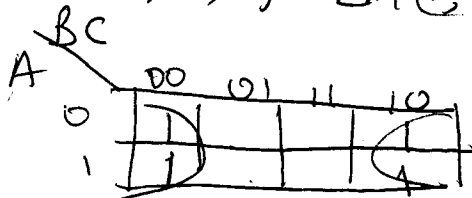
ECE 2030 Homework 3 Solutions

1. a) $F(A, B, C) = \sum m(2, 3, 4, 5)$

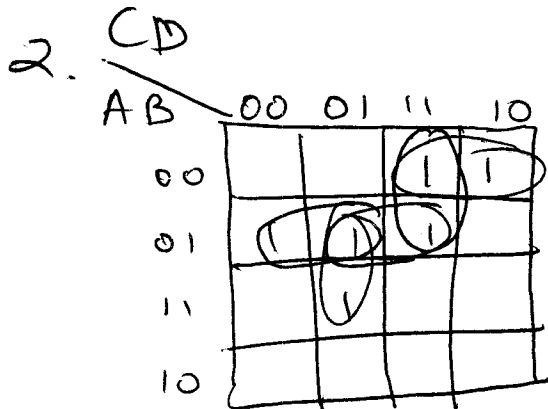


$$F = \bar{A}B + A\bar{B}$$

b) $F(A, B, C) = \sum m(0, 2, 4, 6)$



$$F = \bar{C}$$



prime implicants

essential?

$$\bar{A}\bar{B}C$$

y

$$\bar{A}CD$$

N

$$\bar{A}BD$$

N

$$\bar{A}B\bar{C}$$

y

$$B\bar{C}D$$

y

$$F = \bar{A}\bar{B}C + \bar{A}B\bar{C} + B\bar{C}D + \begin{cases} \bar{A}CD \\ \bar{A}BD \end{cases} \text{ or}$$

either works

2b

		CD			
AB	00	01	11	10	
00	1		1	1	
01			1	1	
11	1			1	
10	1			1	

prime implicant	essential?
$C\bar{D}$	N
$\bar{A}C$	Y
$A\bar{D}$	Y
$\bar{B}\bar{D}$	Y

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

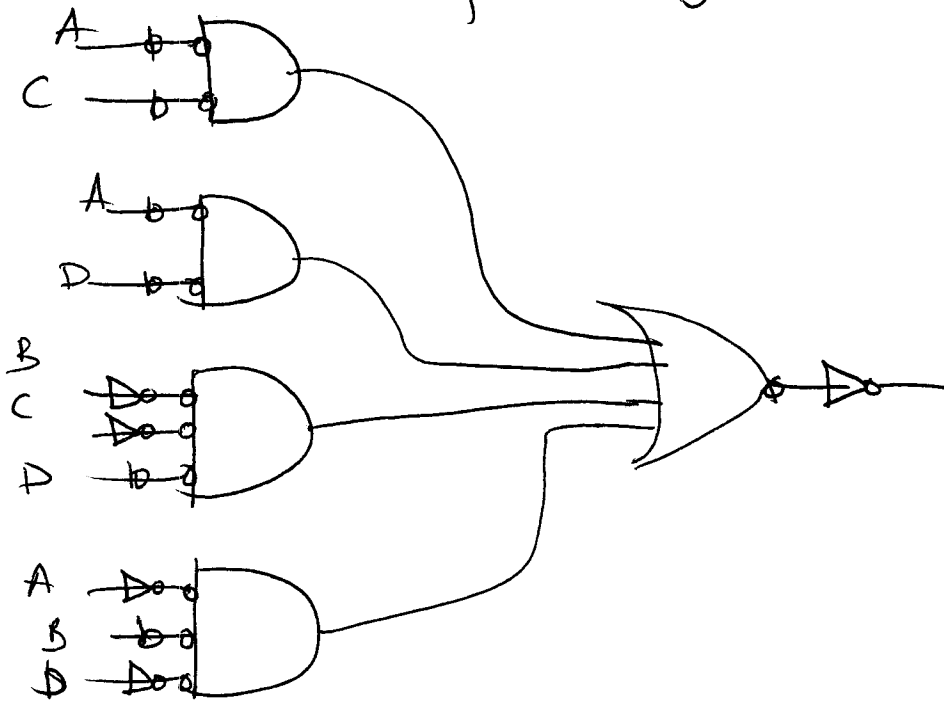
3 $F(A,B,C,D) = \sum m(0,1,2,4,5,6,9,11,14)$

		CD			
AB	00	01	11	10	
00	1	1		1	
01	1	1		1	
11				1	
10		1	1		

prime implicant	essential?
$\bar{A}\bar{C}$	Y
$\bar{A}\bar{D}$	Y
$\bar{B}\bar{C}D$	N
$BC\bar{D}$	Y
$A\bar{B}D$	Y

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

3b. using NOR gates



using NAND gates.



$$4. \quad 0110_2 = 6_{10}$$

$$1110_2 = 14_{10}$$

$$101011_2 = 43_{10}$$

$$5. \quad \begin{array}{r} 81 \\ -64 \\ \hline 17 \\ -16 \\ \hline 1 \end{array} \quad \begin{array}{l} 2^6 \\ \\ 2^4 \\ 2^0 \end{array} \quad 1010001$$

$$\begin{array}{r} 110 \\ -64 \\ \hline 46 \\ -32 \\ \hline 14 \\ -8 \\ \hline 6 \\ -4 \\ \hline 2 \end{array} \quad \begin{array}{l} 2^6 \\ \\ 2^5 \\ 2^3 \\ 2^2 \\ 2^1 \end{array} \quad 1101110$$

$$\begin{array}{r} 139 \\ -128 \\ \hline 11 \\ -8 \\ \hline 3 \\ -2 \\ \hline 1 \end{array} \quad \begin{array}{l} 2^7 \\ \\ 2^3 \\ 2^1 \\ 2^0 \end{array} \quad 10001011$$