

Assignment 2 Reference Solution

1. (a) (c) (c) (b) (b)

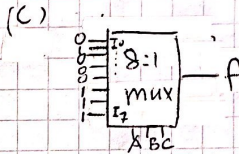
2. $f(A, B, C) = \sum m_i (1, 5, 6, 7)$

A	B	C	f
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

(* for reference only)

(a) $f(A, B, C) = \bar{A} \cdot \bar{B} \cdot C + A \cdot \bar{B} \cdot C$
 $+ \underbrace{A \cdot B \cdot \bar{C}} + \underbrace{A \cdot B \cdot C}$

(b) $f(A, B, C) = (\bar{A} + A) \cdot \bar{B} \cdot C$
 $+ A \cdot B (\bar{C} + C)$
 $= \bar{B} \cdot C + A \cdot B$

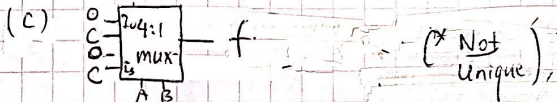


3. $f(A, B, C) = \prod M_i (0, 1, 2, 4, 5, 6)$

A	B	C	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

(a) $f(A, B, C) = (A+B+C) \cdot (A+B+\bar{C}) \cdot$
 $(A+\bar{B}+C) \cdot (\bar{A}+B+C) \cdot (\bar{A}+B+\bar{C}) \cdot$
 $(\bar{A}+\bar{B}+C)$

(b) $f(A, B, C) = (A+B) \cdot (\bar{B}+C) \cdot (\bar{A}+B)$
 $= B \cdot (\bar{B}+C) = B \cdot C$



(* Not Unique)

4. (a) $\bar{A}C + A\bar{B}C + AB + \bar{A}BC$

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

$B+C$ (S.O.P) / (P.O.S)

(b) $(A+B) (\bar{A}+\bar{B}) (A+\bar{B}+\bar{C})$

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

$A \cdot \bar{B} + \bar{A} \cdot B \cdot \bar{C}$ (S.O.P)
 $(A+B) \cdot (\bar{A}+\bar{B}) \cdot (A+\bar{B}+\bar{C})$ (P.O.S)
 OR $(\bar{B}+\bar{C})$

$$5. (a) f(A, B, C) = (A \odot B) \cdot C$$

$$= (\bar{A}\bar{B} + A \cdot B) \cdot C = \bar{A}\bar{B} \cdot C + A \cdot B \cdot C$$

		AB			
		00	01	11	10
C	0	0	0	0	0
	1	1	0	1	0

$$f(A, B, C) = (A + \bar{B}) \cdot (\bar{A} + B) \cdot C$$

$$(b) f(A, B, C, D) = \sum m_i (1, 2, 4, 5, 10, 14)$$

$$+ \sum d_i (0, 6, 13, 15)$$

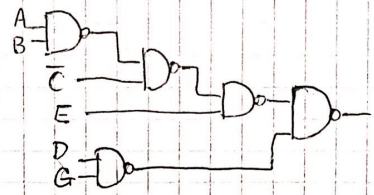
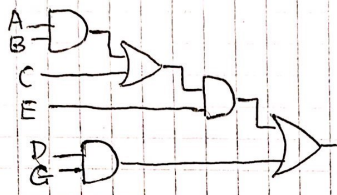
		AB			
		00	01	11	10
CD	00	∅	1	0	0
	01	1	1	0	0
	11	0	0	∅	0
	10	1	∅	1	1

$$f(A, B, C, D) = (\bar{A} + C) \cdot$$

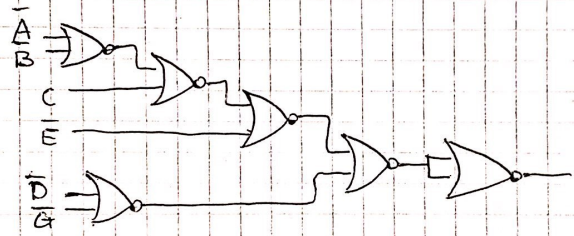
$$(\bar{C} + \bar{D})$$

Not hazard-free.

6. (i) $(A \cdot B + C) \cdot E + D \cdot G$

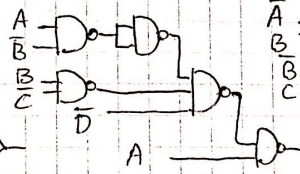
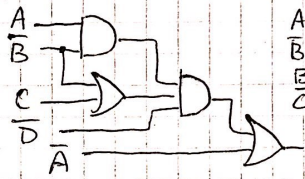


NAND - ONLY

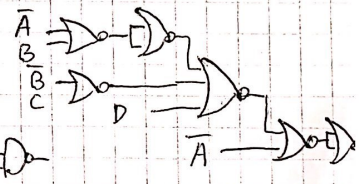


NOR - ONLY

6. (ii) $A \cdot \overline{B} (\overline{B} + C) \cdot \overline{D} + \overline{A}$



NAND ONLY



NOR ONLY

7. Please see the "Ref Solution for midterm Review" in Brightspace.