Digital Logic HW1. 12310401 王子恒

1. (a) base7:

$$\begin{array}{r|l} 7 & 123 \\ 7 & 17 \quad 4 \\ 7 & 2 \quad 3 \\ & 0 \quad 2 \end{array}$$

$0.4 \times 7 = 2.8$ → 2

$0.8 \times 7 = 5.6$ → 5

$(123.4)_{10} = (234.25)_7$

base 12:

$$\begin{array}{r|l} 12 & 123 \\ 12 & 10 \quad 3 \\ & 0 \quad 10 \end{array}$$

$0.4 \times 12 = 4.8$ → 4

$0.8 \times 12 = 9.6$ → 9

$(123.4)_{10} = (X3.49)_{12}$

base 16:

$$\begin{array}{r|l} 16 & 123 \\ 16 & 7 \quad 11 \\ & 0 \quad 7 \end{array}$$

$0.4 \times 16 = 6.4$ → 6

$0.4 \times 16 = 6.4$ → 6.

$(123.4)_{10} = (7B.66)_{16}$

(b) $(791)_{11} = (319)_{11}$

2.

A	B	$A \oplus B$	AB	$A'B'$	$(AB+A'B')'$
0	0	0	0	1	0
0	1	1	0	0	1
1	0	1	0	0	1
1	1	0	1	0	0

From the truth table we can prove $A \oplus B \equiv (AB+A'B')'$

3. (a) $(a+b+c')(a'b'+c)$

$= aa'b' + ac + ba'b' + bc + c'c + a'b'c'$

$= ac + bc + a'b'c'$

(b) $(a+c)(a'+b+c)(a'+b'+c)$

$= (aa' + ab + ac + a'c + bc + c)(a'+b'+c)$

$= (ab + ac + a'c + bc + c)(a'+b'+c)$

$= (ab + bc + c)(a'+b'+c)$

$= abc + a'bc + bc + a'c + b'c + c$

$= a'c + c$

$= c$

0	0	0
0	0	1
0	1	0
0	1	1
1	0	0
1	0	1
1	1	0
1	1	1

4. (a) $F_1(A,B,C) = \Sigma(0,1,2,3,5)$

$= A'B'C' + A'B'C + A'BC' + A'BC + AB'C$

$= A'B' + A'B + AB'C$

$= A' + AB'C$

(b) $F_2(A,B,C) = \Pi(3,5,6,7) = \Sigma(0,1,2,4)$

$= A'B'C' + A'B'C + A'BC' + AB'C'$

$= A'B' + A'BC' + AB'C'$

5.

ab \ cd	00	01	11	10
00	1	1	0	0
01	1	1	0	1
11	1	0	0	1
10	0	0	1	1

(a) $bd' + acd' + ab'c + a'c'$

$= \Sigma(0,1,4,5,6,10,11,12,14)$

(b) $bd' + acd' + ab'c + ab'c + a'c'$

use the truth table:

$= \Pi(2,3,7,8,9,13,15)$

6. a.

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

$$F_1(A,B,C) = \Sigma(2,3,6,7)$$
$$= B$$

b.

AB \ CD	00	01	11	10
00	0	1	0	0
01	d	d	0	0
11	1	1	0	1
10	d	1	0	1

$$F_2(A,B,C,D) = (A+D)(C'+D')$$

c.

WX \ YZ	00	01	11	10
00	0	d	d	0
01	1	1	1	0
11	d	0	0	0
10	1	d	0	d

$$F_3(W,X,Y,Z) = (W+X)(Y'+Z)(W'+Z')$$