Question 1:

octa = 3 bits → 8
hexa = 4 bits → 16

747_{10} = 747/16 = 11, 46/16 = 14, 2/16 = 2

ADE_{16} = 1010 1101 1110_{2}

0000	0	
0001	1	
0010	2	
0011	3	
0100	4	
0101	5	
0110	6	
0111	7	
1000	8	
1001	9	
1010	A	10
1011	B	11
1100	C	12
1101	D	13
1110	E	14
1111	F	15

2 4 8 16 32 64 128 256 512 1024 2048 4096

Question 4

$G02D_{17}$

$13 \cdot 17^0 + 2 \cdot 17^1 + 0 \cdot 17^2 + 16 \cdot 17^3$ = 78 655

78 655 / 9 = 8739 → 4
8739 / 9 = 971 → 0
971 / 9 = 107 → 8
107 / 9 = 11 → 8
11 / 9 = 1 → 2
1 / 9 = 0 → 1

128804_9

Question 5

a) $A\bar{B} + \bar{A}\bar{C}\bar{D} + \bar{A}\bar{B}D + \bar{A}\bar{B}C\bar{D}$

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

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

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

b) $ABC + AB\bar{C} + \bar{A}B$

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

$AB + \bar{A}B$

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

B

Question 6:

→ flip quand negatif → flip +1

	signe	comp1	comp2
a)	01100 (+)	01100	01100
b)	11100 (−)	10011	10100
c)	010011.11	010011.11	010011.11
d)	110001.01	101110.10	101110.11

Question 7

a) 11001 + 11011
comp2 10110 + 10100
10111 + 10101

  10111
  10101
  101100

débordement

b) 10111 + 01011

  10111
  01011
  100010

10 0010 débordement

c) 01011 + 00111

  01011
  + 00111
  10010

10010

Question 8

a) $y + x'z + xy' = x + y + z$

$(y + xy') + x'z = x + y + z$

$y + x + x'z$

$(x + x'z) + y = x + y + z$

$x + z + y = x + y + z$

b) $x'y' + y'z + xz + xy + yz' = x'y' + xz + yz'$

Question 2

a)
  371_8
  + 256_8
  647_8

  371
  − 256
  113_8

b)
  $2EC_{16}$
  $07B_{16}$
  367

  $2EC_{16}$
  − $07B_{16}$
  271

Question 3

$(3b + 5 + 2b + 4)(2b + 1) = 1b^3 + 5b^2 + 1$

64 32 16 8 4 2 1 . 0.5 0.25 0.125

64 32 16 8 4 2 1

Question 6

a) 01100	01100	01100
b) 11100	10011	10100
c) 010011.11	010011.11	010011.11
d) 110001.01	101110.01	101110.1

Question 7

a) 11001 + 11011
10110 + 10100
10111 + 10101

  10111
  + 10101
  101100

b) 10111 + 01011

  10111
  + 01011
  100010

c) 01011 + 00111

  01011
  + 00111
  10010

c) $(ab + a'b') \oplus (c'd + cd')$

$\overline{(ab + \bar{a}\bar{b})}(\bar{c}d + c\bar{d}) + (ab + \bar{a}\bar{b})\overline{(\bar{c}d + c\bar{d})}$

$((\bar{a} + \bar{b}) \cdot (a + b))(\bar{C}D + C\bar{D}) + (ab + \bar{a}\bar{b})((C + \bar{D}) \cdot (\bar{C} + D))$

$(\bar{a}a + \bar{a}b + \bar{b}a + \bar{b}b)(\bar{C}D + C\bar{D}) + (ab + \bar{a}\bar{b})(C\bar{C} + CD + \bar{D}\bar{C} + \bar{D}D)$

$\bar{a}b\bar{C}D + \bar{a}bC\bar{D} + a\bar{b}\bar{C}D + a\bar{b}C\bar{D} + abCD + ab\bar{C}\bar{D} + \bar{a}\bar{b}CD + \bar{a}\bar{b}\bar{C}\bar{D}$

Question 9

a) $wx(\bar{y}z + y\bar{z}) + \bar{w}\bar{x}(\bar{y}+z)(y+\bar{z})$

$wx\bar{y}z + wxy\bar{z} + \bar{w}\bar{x}(\underset{0}{\bar{x}\bar{y}} + \bar{y}\bar{z} + zy + \underset{0}{z\bar{z}})$

$wx\bar{y}z + wxy\bar{z} + \bar{w}\bar{x}\bar{y}\bar{z} + \bar{w}\bar{x}yz$

Question 10

$F = wx\bar{y} + wx\bar{z} + wxz + y\bar{z}$

w	x	y	z	
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

$\Sigma_{produits} = (\bar{w}\bar{x}y\bar{z}) + (\bar{w}xy\bar{z}) + (wx\bar{x}\bar{z}) + (wx\bar{x}\bar{z}) + (wx\bar{y}z) + (wx\bar{z}) + (wxyz)$

produit $(\bar{w}+\bar{x}+\bar{y}+\bar{z})(\bar{w}+\bar{x}+\bar{y}+z)\ldots$

Question 11

$\bar{x} + xy + x\bar{z} + xy + xz$

x	y	z	
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

produit : $x'+y+z'$

somme : $(\bar{x}\bar{y}\bar{z}) + (\bar{x}\bar{y}z) + (\bar{x}y\bar{z}) + (\bar{x}yz) +$

Question 12

a)

yz \ wx	00	01	11	10
00	1	1	0	1
01	0	1	d	0
11	0	d	1	0
10	1	0	1	d

$\bar{x}\bar{z} + \bar{w}x\bar{y} + wxy$

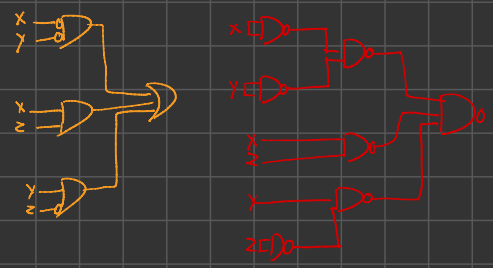
b)

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

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

Question 13

$\bar{x}\bar{y} + xz + y\bar{z}$



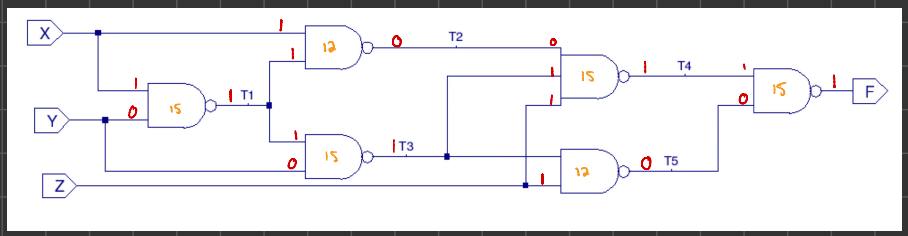
Question 14

x	y	z	
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	0
1	1	1	1

z \ xy	00	01	11	10
0	0	0	0	0
1	1	0	1	1

$z\bar{y} + xz$

Question 15



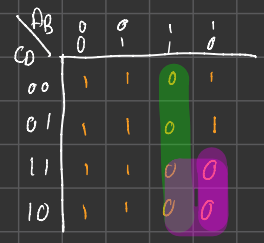
Rep 12 + 15

Question 16

$V_{IH_{min}} < V_{OH_{min}}$ $V_{IL_{max}} > V_{OL_{max}}$

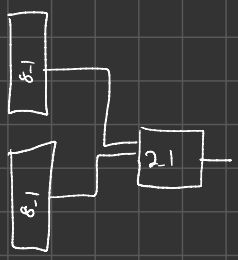
Question 17

0	0	0	0	0	1
0	0	0	1	1	1
0	0	1	0	2	1
0	0	1	1	3	1
0	1	0	0	4	1
0	1	0	1	5	1
0	1	1	0	6	1
0	1	1	1	7	1
1	0	0	0	8	1
1	0	0	1	9	1
1	0	1	0	d	0
1	0	1	1	d	0
1	1	0	0	d	0
1	1	0	1	d	0
1	1	1	0	d	0
1	1	1	1	d	0



AB + AC

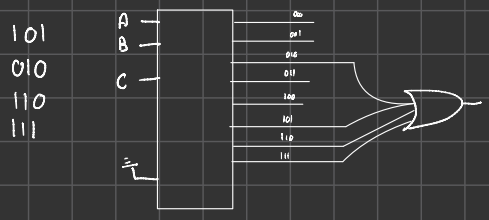
Question 18



Question 19

19.1

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



19.2

Question 20

tu tasse la virgule, tu ajoutes un 0

Question 21

```
if A= '0' and B= '0' then
    F <= '0';
elsif A= '0' and B= '1' then
    F <= '1';
elsif A= '1' and B= '0' then
    F <= '1';
elsif A= '1' and B= '1' then
    F <= '0';
end if;
```

Question 22

SN	$V_{OH} = 2.7v$	74	$V_{IH} = 3,15v$
	$V_{OL} = 0.5v$		$V_{IL} = 3.35v$

Non cela ne marche pas car $V_{OH} < V_{IH}$

$$OH_{min} > IH_{min}$$
$$OL_{max} < IL_{max}$$

Question 23

① -7 à 7 Complement 1

② -7 à 8 Complement 2

Question 1

747_{10}

$747/16 = 46 \Rightarrow 11$

$46/16 = 2 \Rightarrow 14$

$2/16 = 0 \Rightarrow 2$

$ADE_{16} \cdot B$

$14 \cdot 16^0 + 13 \cdot 16 + 10 \cdot 16^2 = 2782.6875_{10}$

Question 2

$371_8 + 256_8 = 647_8$

$371_8 - 256_8 = 113_8$

$2EC_{16} + 07B_{16} = 367$

13 + 11

Question 3

$(3b+5 + 2b+4) \cdot (2b+1) = 1 \cdot b^3 + 5b^2 + 0b + 1$

Question 4

$G02D_{17}$

$13 \cdot 17^0 + 2 \cdot 17^1 + 0 \cdot 17^2 + 16 \cdot 17^3 = 78655$

$78655 / 9 = 8739 \Rightarrow 4$

$8739 / 9 = 971 \Rightarrow 0$

$971 / 9 = 107 \Rightarrow 8$

$107 / 9 = 11 \Rightarrow 8$

$11 / 9 = 1 \Rightarrow 2$

$1 / 9 = 0 \Rightarrow 1$

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Question 5

a) $A\bar{B} + \bar{A}\bar{C}\bar{D} + \bar{A}\bar{B}D + \bar{A}\bar{B}C\bar{D}$

Question 6

	signe	C_1	C_2
a)	01100	01100	0110
b)	11100	10011	10100
c)	010011.11	010011.11	010011.11
d)	110001.01	101110.10	101110.11

Question 7

1 2 4 8 16 32 64 128

a) 11001 + 11011

C_1 10110 + 10100

C_2 10111 + 10101

10111 + 10101 = 101100

b) 11001 + 01011

10110

10111 + 01011

01011 + 10111 = 100010

c) 01011 + 00111

01011 + 00111 = 10010

Question 9

a) $\overline{\bar{w}x(\bar{y}z + y\bar{z}) + \bar{w}\bar{x}(\bar{y}+z)(y+\bar{z})}$

$(\bar{w} + \bar{x} + (y+\bar{z})(\bar{y}+z)) \cdot (w + x + (y\bar{z}) + (\bar{y}z))$

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

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

Question 10

w	x	y	z	
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Somme $= \bar{w}\bar{x}y\bar{z} + \bar{w}xy\bar{z} + w\bar{x}y\bar{z} + wx\bar{y}\bar{z} + wx\bar{y}z + wxy\bar{z} + wxyz$

Produit $= (\bar{w}+\bar{x}+\bar{y}+\bar{z})(\bar{w}+x+\bar{y}+z)(\bar{w}+\bar{x}+y+z)(\bar{w}+x+\bar{y}+z)$

Question 11

Question 23

	C_1	C_2
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	-7	-8
1001	-6	-7
1010	-5	-6
1011	-4	-5
1100	-3	-4
1101	-2	-3
1110	-1	-2
1111	0	-1

a) -7 à 7

b) -12 à 2

c) 5 bits

d)