① 0 1 2 3 4 5 6 7 8 9 A B C D E F
                              10 11 12 13 14 15

A) xBEEF = $\frac{11}{1011}$ $\frac{14}{1110}$ $\frac{14}{1110}$ $\frac{15}{1111}$

    xDEAD = $\frac{13}{1101}$ $\frac{14}{1110}$ $\frac{10}{1010}$ $\frac{13}{1101}$

```
     1011 1110 1110 1111
 OR  1101 1110 1010 1101      = xFEEF
     ─────────────────────
     1111 1110 1110 1111
      F    E    E    F
```

B) XOR same is always 0. = x0000

C)
    xABEE = $\frac{10}{1010}$ $\frac{11}{1011}$ $\frac{14}{1110}$ $\frac{14}{1110}$

    xAFEE = $\frac{10}{1010}$ $\frac{15}{1111}$ $\frac{14}{1110}$ $\frac{14}{1110}$

```
       00   00   0 1
       0 1   0 1  1 1
       1 0  1 0  1
       1 1   1    0
```

```
 NAND  1010 1011 1110 1110
       1010 1111 1110 1110
       ──────────────────────      = x5411
       0101 0100 0001 0001
        5    4    1    1
```

D)
    xABCD = $\frac{10}{1010}$ $\frac{11}{1011}$ $\frac{12}{1100}$ $\frac{13}{1101}$

NOT(xFFFF) = 0000000000000000

    XOR with 0s stays same. = xABCD

E)

xFEED = $\overset{15}{\overline{1111}}\,\overset{14}{\overline{1110}}\,\overset{14}{\overline{1110}}\,\overset{13}{\overline{1101}}$

xFACE = $\overset{15}{\overline{1111}}\,\overset{10}{\overline{1010}}\,\overset{12}{\overline{1100}}\,\overset{14}{\overline{1110}}$

NOT(xFACE) = 0000 0101 0011 0001

NOR

```
    1111 1110 1110 1101
    0000 0101 0011 0001
    _____
    0000 0000 0000 0010   = x0002
```

②

x436F

ASCII: "Co"

4	3	6	15
0 1 0 0	0 0 1 1	0 1 1 0	1 1 1 1

0 1 0 0 0 0 1 | 1 0 1 1 0 1 1 1 1

+

32 + 1 = 33

$2^5 - 1 = 31$

33 - 31 = 2

BINARY: 1.10110111×2^2

$1 1 0 . 1 1 0 1 1 1 1$

6

$\frac{1}{2} + \frac{1}{4} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{128} = 0.8672$

DECIMAL: 6.8672

x BB5A

ASCII: "ÑZ"

11	11	5	10
1 0 1 1	1 0 1 1	0 1 0 1	1 0 1 0

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

1 + 4 + 8 + 16
= 29

29 - 31 = -2

BINARY: $-1.101011010 \times 2^{-2}$

$- 0.01101011010$

$\frac{1}{4} + \frac{1}{8} + \frac{1}{32} + \frac{1}{128} + \frac{1}{256} + \frac{1}{1024} = 0.4489$

DECIMAL: - 0.4489

③

X	Y	Z	Q1	Q2	X.Y.Z	Y+Z
0	0	0	0	1	0	0
0	0	1	0	1	0	1
0	1	0	0	1	0	1
0	1	1	0	1	0	1
1	0	0	1	1	0	0
1	0	1	1	1	0	1
1	1	0	1	1	0	1
1	1	1	0	0	1	1

(4)

A)

10.12

1010.0001111

1.0100001×2^3

$+ 1.0100001 \times 2^3$

$3 + 2^3 - 1 = 3 + 7 = 10$

$\underbrace{1010}$

| 12 |
| 0 24 |
| 0 48 |
| 0 96 |
| 1 92 |
| 1 84 |
| 1 68 |
| 1 36 |

(010100100001) F.P. $(n=12, e=4)$

B)

001101100100

$6 - 7 = -1$

1.1100100×2^{-1}

$= 0.111001$

$= \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{64}$

$= \frac{32 + 16 + 8 + 1}{64} = \frac{57}{64}$

C)

111101111111

$14 - 7 = 7$

$-(1.1111111 \times 2^7$

$-11111111 = 1 + 2 + 4 + 8 + 16 + 32 + 64 + 128$

$= -255$

D) 0 0001 0000000

+ 1-7=-6

0.000010×2^{-6}

0.000001

$= 1/64$

E) 0 00000000001

1-7=-6

0.0000001×2^{-6}

0.000000000001

$= \dfrac{1}{8192}$

⑤

A) $A + (A \cdot B)'$

$A + A' + B'$

$1 + B'$

1

B) $XY + X'Z + YZ$

$XY + X'Z + YZ(X + X')$

$XY + X'Z + YZX + YZX'$

$XY(1 + Z) + X'Z(1 + Y)$

$XY + X'Z$

C) $A'B + AB + A + AB'$

$A(B + 1 + B') + A'B$

$A + A'B$

$A + B$

D) $XZ + Z(X' + XY)$

$XZ + Z(X' + Y)$

$XZ + ZX' + ZY$

$Z(X + X' + Y)$

$Z(1 + Y)$

$Z(1)$

Z

E) $(A+B)'(C+D+E)' + (A+B)'$

$(A+B)'[(C+D+E')+1]$

$(A+B)'(1)$

$(A+B)'$

$A'B'$

⑥ SOP:

$$X'Y'Z + X'YZ + XY'Z' + XYZ'$$

$$X'Z(Y' + Y) + XZ'(Y' + Y)$$

$$X'Z + XZ'$$

POS:

$$(X+Y+Z)(X+Y'+Z)(X'+Y+Z')(X'+Y'+Z')$$

⑦ A'B'C' + A'BC + AB'C + ABC'
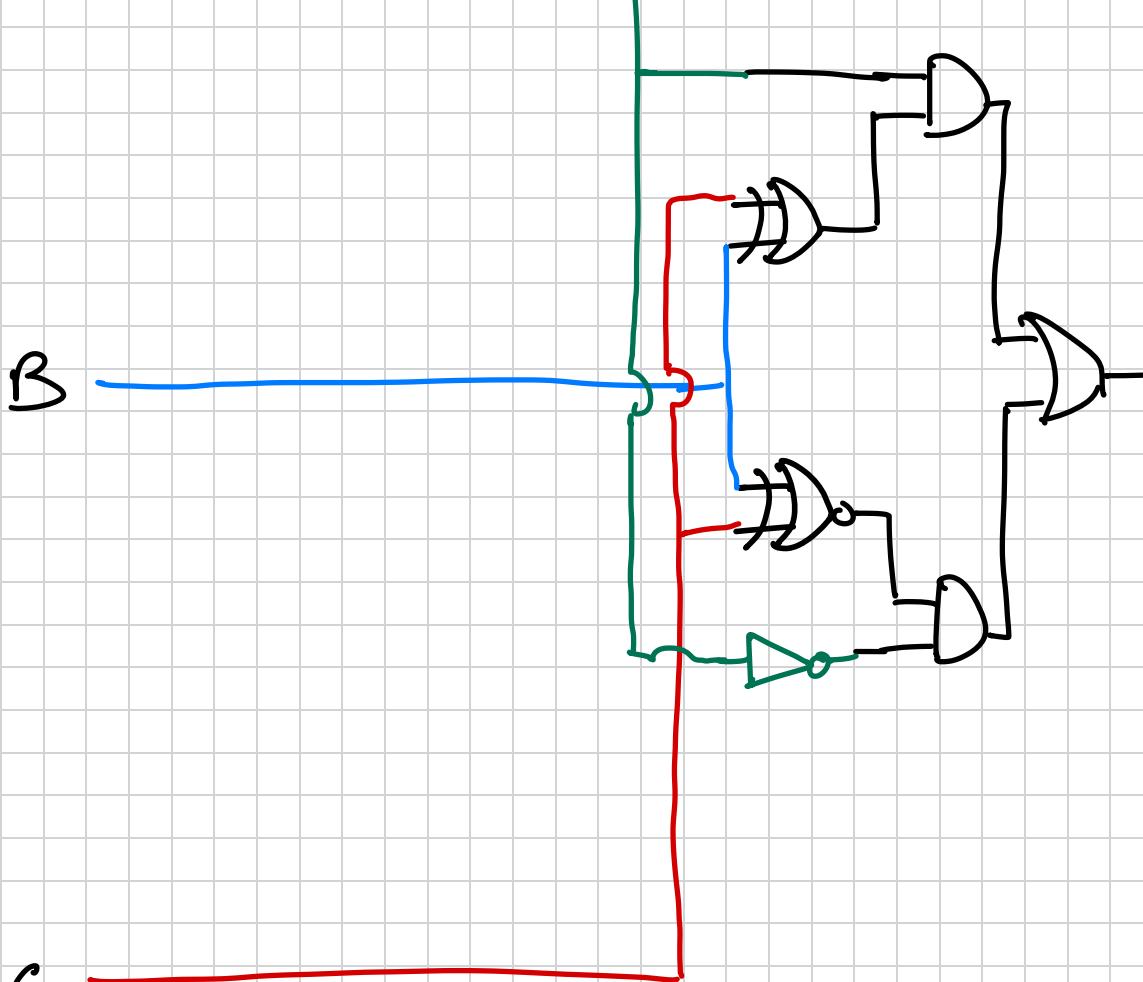
A'(B'C' + BC) + A(B'C + BC')

XNOR · XOR
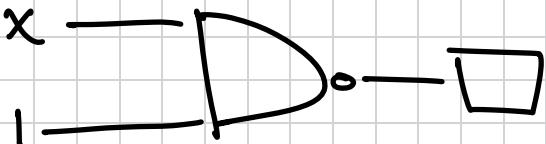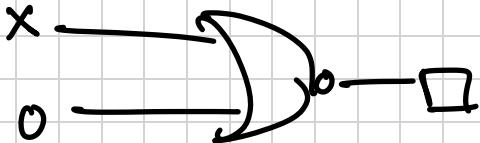
⑧
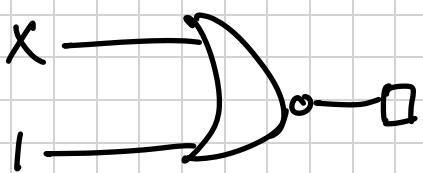
X	1		NAND(1,x)
0	1		1
1	1		0

If one of the inputs to a NAND is 1, then the output is x complement.
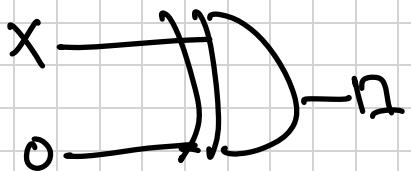
X	0	NOR(x,0)
0	0	1
1	0	0

If one of the inputs to a NOR is 0, then the output is x complement.
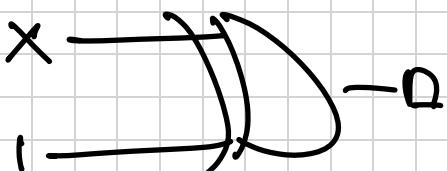
X	1		NOR(x,1)
0	1		0
1	1		0

If one of the inputs to a NOR is 1, then the output is 0.

X	0	XOR(x,0)
0	0	0
1	0	1

If one of the inputs to a XOR is 0, then the output is x

X	1		XOR(x,1)
0	1		1
1	1		0

If one of the inputs to a XOR is 1, then the output is x complement.