



Practical works (TD1)

❖ Exercice 1 :

1/ Convert the following value: 256B in bits / 4KB in B / 3GB in KB / 1TB in BYTES.

2/ A machine instruction is encoded on 8 bits.

How many different instructions can be coded?

1) How many minimum bits are needed to encode:

→ The days of the week → the days of a month?

❖ Exercice 2 :

➤ Convert the following numbers between bases:

$(110101001)_2 = ()_{10}$	$(65)_8 = ()_{16}$	$(25)_{10} = ()_2$	$(1907)_{10} = ()_{16}$	$(A5B2)_{16} = ()_2$
$(11111111)_2 = ()_{10} = ()_{16}$	$(8473)_{10} = ()_2 = ()_{16}$	$(EF1)_{16} = ()_2 = ()_{10}$	$(208)_{10} = ()_8 = ()_{16}$	$(15,3125)_{10} = ()_2$

➤ Perform the following operations:

F39+68B

2CF3+2B

11010+1111

11010+1111+1010+111

1100101-1001010

$(11011101)_2 - (55)_{10}$

AC74 – B3F

11010- 1111

➤ Apply bitwise logic, Express each result in binary and decimal.

· **AND:** 1101 & 1011

OR: 1101 | 1011

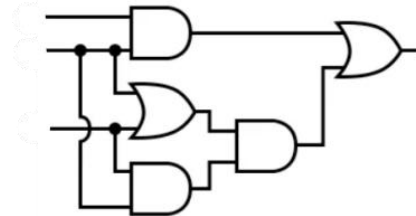
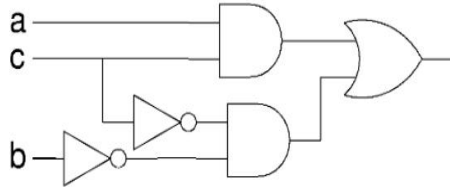
XOR: 1101 ^ 1011

❖ Exercice 3:

Consider the following logic circuit with three inputs **a**, **b**, **c**:

1. Write the Boolean expression of the output **F** in terms of **a**, **b**, **c**.





2. Given the Boolean function: $F(A,B,C)=\overline{A}B+A\overline{B}C+ABC$

Construct the truth table for the function $F(A,B,C)$

Simplify the expression using Boolean algebra laws or a Karnaugh map

Draw the logic circuit corresponding to the simplified Boolean expression, using AND, OR, and NOT gates.

❖ **Exercise 5:** A 3-bit counter (Q2 Q1 Q0) counts the clock pulses.

What is the maximum value it can count?

How many different states does it have?

What is the next value after 111?

❖ **Exercise 4:**

Among the following components: video game, PIN code locking system, speed radar sensor, self-checkout system, classroom attendance management system, automatic traffic light, light switch, industrial filling machine, computer keyboard

➤ which ones operate using **combinational logic**, which ones use **sequential logic**, and which ones process data in **binary form**?

Provide justification for each case.

