Homework assignment-1

Student : Laye Yomba Ifono

E-mail: layeyomba12@gmail.com

Phone: +224 621-95-20-82

1. **Make the following base conversions. Use shortcuts when applicable.**

Converting a binary number to decimal

a. $\mathbf{(101101011)_2}$

Step 1: Understand bit positions

Each digit in a binary number represents a power of 2, starting with 0 on the right.

$1\times2^8+0\times2^7+1\times2^6+1\times2^5+0\times2^4+1\times2^3+0\times2^2+1\times2^1+1\times2^0$

Calculating each term:

$=256+0+64+32+0+8+0+2+1=363$

So, $(\mathbf{101101011})_2 = 363_{10}$.

Converting a binary number to hexadecimal

b. $\mathbf{(110010011001110)_2}$

Step 1: Group the numbers by 4

Hexadecimal works by grouping binary digits in packets of 4. We start from the right:

110 0100 1100 1110

If there are missing digits on the left, we can add 0 to complete a group of 4:

0110 0100 1100 1110

Then each group is converted to its hexadecimal equivalent:

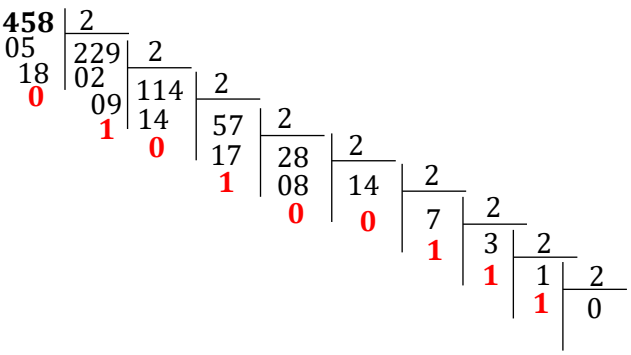
- 0110=6
- 0100=4
- 1100 =C
- 1110=E

So, $(\mathbf{110010011001110})_2 = \mathbf{64CE}_{16}$

Converting a decimal number to binary

c. $\mathbf{(458)_{10}}$

We divide the number by 2 and note the remainders, until we obtain 0.



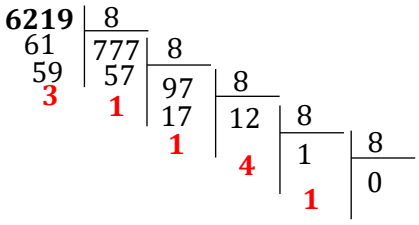
Reading the remainders from bottom to top, we obtain :

$(\mathbf{458})_{10} = (\mathbf{111001010})_2$.

Converting a decimal number to octal

d. $\mathbf{(6219)_{10}}$

We divide the number by 8 and note the remainders.



Reading the remainders from bottom to top, we obtain :

$(\mathbf{6219})_{10} = (\mathbf{14113})_8$

Converting a decimal number to hexadecimal

e. $\mathbf{(19055)_{10}}$

We divide by 16 and note the remainders:

Converting a hexadecimal number to binary

f. $\mathbf{(E5A)_{16}}$

Each hexadecimal digit can be converted directly to binary:

E = 1110

5 = 0101

A = 1010

So, $(E5A)_{16}=(\mathbf{11100101010})_2$.

Converting a hexadecimal number to decimal.

g. $\mathbf{(F2C9)_{16}}$

We multiply each hexadecimal digit by the power of 16 that corresponds to it :

$\mathbf{F2C9_{16}} = 15\times16^3+2\times16^2+12\times16^1+9\times16^0$

= 15×**4096**+2×**256**+12×16+**9** = **62153**

So, $(F2C9)_{16}$ = **6215310**

2. **Convert -4 to binary using 8-bit two's complement representation.**

For negative numbers, 2's complement is often used. This allows negative numbers to be represented in binary.

Convert **−4** to binary (8-bit 2's complement)

Convert $\mathbf{4_{10}}$ to binary

$\mathbf{4_{10}}$ = $\mathbf{00000100_2}$.

Invert bits

Invert all bits (1's complement):

11111011

Add 1 to get 2's complement:

11111100

So,**−4** in binary (2's complement on 8 bits) is : $\mathbf{11111100_2}$