

Représentation des entiers - exercices

Correction

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Première - NSI

DonRep 03

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décimal	binaire
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010

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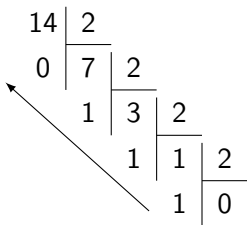
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- ▶ $14_{10} \rightarrow 00001110_2$
- ▶ $222_{10} \rightarrow 11011110_2$
- ▶ $42_{10} \rightarrow 00101010_2$
- ▶ $79_{10} \rightarrow 01001111_2$

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Exercice 2

```
1 n = int(input("Entrer un entier positif: "))
2 res = ""
3 while (n > 0):
4     res = str(n % 2)+res
5     n = n//2
6 print(res)
```

Code 1 – Conversion décimal → binaire

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$$1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 10$$

► $1010_2 \rightarrow 10_{10}$

► $111110_2 \rightarrow 62_{10}$

► $100101001_2 \rightarrow 297_{10}$

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On décompose en blocs de 4 bits :

$$1001_2 \ 0101_2 = 9_{16} \ 5_{16}$$

- ▶ $10010101_2 \rightarrow 95_{16}$
- ▶ $11010101_2 \rightarrow D5_{16}$
- ▶ $100010001_2 \rightarrow 111_{16}$
- ▶ $11001101001010_2 \rightarrow 334A_{16}$

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- ▶ $AA = 1010_2 1010_2 = 10101010$
- ▶ $BB8 = 1011_2 1011_2 1000_2 = 101110111000$
- ▶ $B \times 16^3 + E \times 16^2 + E \times 16^1 + F \times 16^0 =$
 $11 \times 16^3 + 14 \times 16^2 + 14 \times 16^1 + 15 \times 16^0 = 48879$

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- ▶ $10_{10} = 00001010_2$ *donc* $-10_{10} = 11110101 + 1 = 11110110_2$
- ▶ $128_{10} = 10000000_2$ *donc* $-128_{10} = 01111111 + 1 = 10000000_2$

Remarque

Nous remarquons qu'il s'agit de la même représentation que 128 : sur 8 bits, nous ne pouvons pas représenter l'entier positif 128 !!!

- ▶ $42_{10} = 00101010_2$ *donc* $-42_{10} = 11010101 + 1 = 11010110_2$
- ▶ $97_{10} = 01100001_2$

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Première méthode :

► $11100111_2 = 231_{10}$ et $231 - 2^8 = -25$

► $11000001_2 = 193_{10}$ et $193 - 2^8 = -63$

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Deuxième méthode :

- Le complément à 2 de 11100111_2 vaut 00011000_2 .
Ensuite $00011000_2 + 1_2 = 00011001_2 = 25_{10}$ donc
 $11100111_2 = -25_{10}$.
- Le complément à 2 de 11000001_2 vaut 00111110_2 .
Ensuite $00111110_2 + 1_2 = 00111111_2 = 63_{10}$ donc
 $11000001_2 = -63_{10}$.

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$$39 + 110 = 00100111_2 + 01101110_2 = 10010101_2 = 149$$

$$\begin{array}{rcccccccc} & 1 & 1 & & 1 & 1 & 1 & & \\ & 0 & 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ + & 0 & 1 & 1 & 0 & 1 & 1 & 1 & 0 \\ \hline 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 1 \end{array}$$

1. $39 + 110 = 00100111_2 + 01101110_2 = 10010101_2 = 149$
2. $-53 + 35 = 11001011_2 + 00100011_2 = 11101110_2 = -18(238 - 256)$
3. $119 - 8 = 01110111_2 + 11111000_2 = 01101111_2 = 111$

Remarque

Les chiffres au-delà de 8 bits sont tronqués.

4. $19 - 93 = 00010011_2 + 10100011_2 = 10110110_2 = -74(182 - 256)$

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