Réponses Série 1 Syst. numération

Exercice 1

1. $(243)_5 = 2 \cdot 5^2 + 4 \cdot 5 + 3 = 73$,

2. $(10101101)_2 = 2^7 + 2^5 + 2^3 + 2^2 + 1 = 173$,

3. $(15; 3; 11)_{17} = 15 \cdot 17^2 + 3 \cdot 17 + 11 = 4397$,

4. $(516)_7 = 5 \cdot 7^2 + 1 \cdot 7 + 6 = 258$,

5. $(8; 5; 2; 7)_{11} = 8 \cdot 11^3 + 5 \cdot 11^2 + 2 \cdot 11 + 7 = 11282$,

6. $(1234)_5 = 1 \cdot 5^3 + 2 \cdot 5^2 + 3 \cdot 5 + 4 = 194$.

Exercice 2

1.

$$\begin{aligned} 547 &= 2 \cdot 273 + 1 \\ 273 &= 2 \cdot 136 + 1 \\ 136 &= 2 \cdot 68 + 0 \\ 68 &= 2 \cdot 34 + 0 \\ 34 &= 2 \cdot 17 + 0 \\ 17 &= 2 \cdot 8 + 1 \\ 8 &= 2 \cdot 4 + 0 \\ 4 &= 2 \cdot 2 + 0 \\ 2 &= 2 \cdot 1 + 0 \\ 1 &= 2 \cdot 0 + 1 \end{aligned}$$

donc $547 = (1000100011)_2$.

2.

$$\begin{aligned} 2053 &= 11 \cdot 186 + 7 \\ 186 &= 11 \cdot 16 + 10 \\ 16 &= 11 \cdot 1 + 5 \\ 1 &= 11 \cdot 0 + 1 \end{aligned}$$

donc $2053 = (1; 5; 10; 7)_{11}$.

3. $2010150300 = (2; 10; 150; 300)_{1000}$.

4.

$$\begin{aligned} 1671 &= 7 \cdot 238 + 5 \\ 238 &= 7 \cdot 34 + 0 \\ 34 &= 7 \cdot 4 + 6 \\ 4 &= 7 \cdot 0 + 4 \end{aligned}$$

donc $1671 = (4605)_7$.

5.

$$\begin{aligned} 15307 &= 25 \cdot 612 + 7 \\ 612 &= 25 \cdot 24 + 12 \\ 24 &= 25 \cdot 0 + 24 \end{aligned}$$

donc $15307 = (24; 12; 7)_{25}$.

6.

$$\begin{aligned} 63 &= 5 \cdot 12 + 3 \\ 12 &= 5 \cdot 2 + 2 \\ 2 &= 5 \cdot 0 + 2 \end{aligned}$$

donc $63 = (223)_5$.

Exercice 3

1. $(12043)_5 = 898 = (3; 14; 13)_{15}$

2. $(2; 0; 10; 9)_{12} = 3585 = (320001)_4$

3. $(2534)_6 = 634 = (1564)_7$

4. $(17; 12; 5; 8)_{18} = 103130 = (8; 10; 21; 21)_{23}$

Exercice 4

1. $(24165)_9$ **2.** $(1122102)_3$

3. $(4; 17; 21)_{25}$ **4.** $(432131423)_5$

Exercice 5

1. $(21)_{25} = (41)_5\,, (17)_{25} = (32)_5\,, (3)_{25} = (03)_5\,, (6)_{25} = (11)_5\,.$
   Donc $(21; 17; 3; 6)_{25} = (41320311)_5$.
2. $(1|021|121|101)_3 = (1; 7; 16; 10)_{27}$
3. $(82)_{125} = (312)_5\,, (77)_{125} = (302)_5\,, (21)_{125} = (041)_5\,, (7)_{125} = (012)_5\,.$
   Donc $(82; 77; 21; 7)_{125} = (312302041012)_5$.
4. $(101|10100|01101)_2 = (5; 20; 13)_{32}$.
5. $(31022)_4 = (1|101|001|010)_2 = (1512)_8$.
6. $(25; 9; 7)_{27} = (2|21|10|00|21)_3 = (27307)_9$.

Exercice 6

1. $(361)_8$ **2.** $(111)_{10}$ **3.** $(F1)_{16}$

4. $(47605)_{10}$ **5.** $(33)_8$ **6.** $(11\,101)_2$

7. $(1011\,0101\,1100)_2$ **8.** $(B7A)_{16} = (5572)_8$

Exercice 7

On passe de la base 3 à la base $3^3 = 27$ afin d'utiliser la régularité du nombre. Comme $(20)_3 = (6)_{27}$ et $(120)_3 = (15)_{27}$, on a $(20120120120120120120)_3 = (6; 15; 15; 15; 15; 15; 15)_{27}$ et

$$(6; 15; 15; 15; 15; 15; 15)_{27} = 6 \cdot 27^6 + 15 \cdot (27^5 + \ldots + 27^0) = 2'548'034'754\,.$$