Exercice N° 1

1) Conversion en décimal

a) $(\overset{6}{1}\overset{5}{1}\overset{4}{1}\,\overset{3}{0}\overset{2}{0}\overset{1}{0}\overset{0}{1})_2 = 1(2)^0 + 1.2^4 + 1.2^5 + 1.2^6 = (113)_{10}$

b) $(123)_4 = 3.4^0 + 2.4^1 + 1.4^2 = (27)_{10}$

c) $(284)_9 = 4.9^0 + 8.9^1 + 2.9^2 = (238)_{10}$

d) $(11B)_{12} = B(12)^0 + 1(12)^1 + 1(12)^2 = (167)_{10}$

2) $(133)_{10} = (11221)_3$

$$\begin{array}{r|l} 133 & 3 \\ \hline 1 & 44 \end{array} \quad \begin{array}{r|l} 44 & 3 \\ \hline 2 & 14 \end{array} \quad \begin{array}{r|l} 14 & 3 \\ \hline 2 & 4 \end{array} \quad \begin{array}{r|l} 4 & 3 \\ \hline 1 & 1 \end{array} \quad \begin{array}{r|l} 1 & 3 \\ \hline 1 & 0 \end{array}$$

$(133)_{10} = (250)_7$

$(133)_{10} = (97)_{14}$

a) $(184)_x = (157)_{10}$

$x^2 + 8x - 153 = 0$

$\Delta = 676 \Rightarrow \sqrt{\Delta} = \pm 26$

$x_1 = \dfrac{-8-26}{2}$ rejetée < 0

$x_2 = \dfrac{-8+26}{2} = 9$ solution retenue. donc $\boxed{x = 9}$

b) $(334)_y + (244)_y = (600)_y$

$-y^2 + 7y + 8 = 0$

$\Delta = 81 \Rightarrow \sqrt{\Delta} = \pm 9$

$y_1 = \dfrac{-7-9}{-2} = 8$ solution retenue. donc $\boxed{y = 8}$

$y_2 = \dfrac{-7+9}{-2} = -1 < 0$ " rejetée

c) $(701)_z - (376)_z = (37A)_z$

$z^2 - 14z - 15 = 0$

$\Delta = 256 \Rightarrow \sqrt{\Delta} = \pm 16$

$z_1 = \dfrac{14-16}{2} < 0$ rejetée

$z_2 = \dfrac{14+16}{2} = 15$ solution retenue donc $\boxed{z = 15}$

a) $(r1)_{13} = (SC)_{16}$ $r = ?$, $S = ?$

conversion en décimal des deux nombres:

$1 + 13r = C + 16S$

$13r = 11 + 16.S \Rightarrow r = \dfrac{11+16S}{13}$

$r \in \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C\}$

$S \in \{0, 1, 2, \ldots, 9, A, B, C, D, E, F\}$

pour:

$S = 0 \longrightarrow$ impossible $r =$ nbr fractionnaire

$S = 1 \longrightarrow$ " " "

$S = 2 \longrightarrow$ " " "

$S = 3 \longrightarrow$ " " "

$S = 4 \longrightarrow$ " " "

$S = 5 \Rightarrow r = \dfrac{91}{13} = 7$ solution retenue.

$\boxed{S = 5 \text{ et } r = 7}$

b) $(3t2, u3)_6 = (134, 25)_{10}$

$\begin{cases} (3t2)_6 = (134)_{10} \\ (0,u3)_6 = (0.25)_{10} \end{cases} \Rightarrow \begin{cases} 6t + 110 = 134 \\ u.6^{-1} + 3.6^{-2} = 0.25 \end{cases}$

$\Rightarrow \begin{cases} t = \dfrac{24}{6} = 4 \\ u = \dfrac{9-3}{6} = 1 \end{cases} \Rightarrow \boxed{t = 4 \ \& \ u = 1}$

1) a) $(101,001011)_2 = 1\times 2^0 + 0\cdot 2^1 + 1\cdot 2^2 + \cancel{0\times 2^{-1}} + \cancel{0\cdot 2^{-2}} + 1\cdot 2^{-3} + \cancel{0\cdot 2^{-4}} + 1\cdot 2^{-5} + 1\cdot 2^{-6}$

$= (5,171875)_{10}$

$\simeq (5,1719)_{10}$

b) $(17A,5B6)_{16} = A(16)^0 + 7\cdot(16)^1 + 1\times(16)^2 + 5\times(16)^{-1} + B(16)^{-2} + 6\cdot(16)^{-3}$

$= (378,3569)_{10}$

c) $(122,101)_3 = (17,3704)_{10}$

2) a) <u>convertir en base 2</u>

$0,0625 \times 2 = 0,125 \longrightarrow 0$

$0,125 \times 2 = 0,25 \longrightarrow 0$

$0,25 \times 2 = 0,5 \longrightarrow 0$

$0,5 \times 2 = 1,0 \longrightarrow 1$

$\Rightarrow (0,0625)_{10} = (0,0001)_2$

<u>convertir en base 6</u>

$0,0625 \times 6 = 0,375 \longrightarrow 0$

$0,375 \times 6 = 2,25 \longrightarrow 2$

$0,25 \times 6 = 1,5 \longrightarrow 1$

$0,5 \times 6 = 3 \longrightarrow 3$

$(0,0625)_{10} = (0,0213)_6$

<u>convertir en base 16</u>

$0,0625 \times 16 = 1 \Rightarrow (0,0625)_{10} = (0,1)_{16}$

b) $(225,4)_{10} = (11100001,0110)_2$

$= (1013,2222)_6$ périodicité du 2.

$= (E1,6666)_{16}$ " " 6

$(75,33)_{10} = (?) = (?)_8 = (?)_{16}$ $(4B,547A)_{16}$

$(1001011,0101)_2$ $(203,2552)_8$

NB : Les questions b et c doivent être résolues avec les étudiants de la même manière que (a) avec les moindres détails.

3)

a)

$$\overbrace{011}^{3}\,\overbrace{001}^{1}\,\overbrace{011}^{3},\overbrace{011}^{3}\,\overbrace{011}^{3}\,\overbrace{010}^{2} = (313,332)_8$$

$$0\underbrace{1100}_{C}\,\underbrace{1011}_{B},\underbrace{0110}_{6}\,\underbrace{1101}_{D}\,0 = (CB,6D)_H$$

b)

$$\overbrace{011}^{3}\,\overbrace{101}^{5}\,\overbrace{101}^{5}\,\overbrace{001}^{1},\overbrace{010}^{2}\,\overbrace{111}^{7}\,00 = (3551,27)_8$$

$$\underbrace{0111}_{7}\,\underbrace{0110}_{6}\,\underbrace{1001}_{9},\underbrace{0101}_{5}\,\underbrace{1100}_{C} = (769,5C)_H$$

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