

الحل النموذجي مادة بنية الآلة امتحان (A)

Exercice 011

\*  $101010011100,111 = 5234,7_{(8)} = AgC, E_{(16)}$

\*  $8,75_{(10)} \times 2^{+6} = 10,6_{(8)} \times 8^{+2} = 1060_{(8)}$

\*  $16 \times 2^{-7} + 9 = 2^4 \times 2^{-7} + 9 = 2^{-3} + 2^{+3} + 2^0 = 1001,001_{(2)}$

\*  $125,375 = 175,3_{(8)} = 7D,6_{(16)}$

\*  $B0F,8_{(16)} = 11 \times 16^2 + F \times 16^1 + 8 \times 16^0 = 2831,8_{(10)}$

\*  $1010110_{(Gray)} = 1100100_{(2)} = 100_{(10)}$

\*  $65_{(8)} = 110101_{(2)} = 101111_{(Gray)}$

2)  $57_{(16)} = 5 \times 16 + 7 = 87_{(10)}$

$62_{(16)} = 6 \times 16 + 2 = 98_{(10)}$

BCD

$87_{(10)} = \begin{array}{|c|c|} \hline 1000 & 0111 \\ \hline 1001 & 1000 \\ \hline \end{array}$

1	0001	1111	1
	+ 0110	+ 0110	
0001	1000	0101	
	8	5	

Excedent-3

87 =	0011	1011	1010
98 =	0011	1100	1011
	+ 0111	+ 1000	+ 0101
	- 0011	+ 0011	+ 0011
	0100	1011	1000
	1	8	5

3) le code ASCII du Mot: Machine 2021 et:

M a e h i n e 2 0 2 1

4D 61 63 68 69 6E 65 32 30 32 31

2



## Exercise 2:

$$1) AC_{(16)} = 10101100_{(2)}$$

SVA

$$\frac{1}{5} | 10101100 = - (2^5 + 2^3 + 2^2) = \boxed{-44}_{(10)} \quad (0,75)$$

CR

$$\frac{1}{5} | 10101100 = \frac{1}{5} | 10100111_{(SVA)} \quad (0,75) \\ = - (2^6 + 2^4 + 2^1 + 2^0) = \boxed{-83}_{(10)}$$

CV

$$\frac{1}{5} | 10101100 = \frac{1}{5} | 1010100_{(SVA)} \\ = - (2^6 + 2^4 + 2^2) = \boxed{-84}_{(10)}$$

$$2) -97_{(16)} = 100\Delta 0111_{(2)}$$

done  $-97_{(16)} = 1100\Delta 0111_{(SVA)} = \Delta 011\Delta 0\Delta 00\Delta_{(CV)}$

$$26_{(10)} = 11010_{(2)}$$

done  $+26 = 000011010_{(SVA)} = 000011010_{(CV)}$

$$-97_{(16)} \quad \Delta 011\Delta 0\Delta 00\Delta$$

$$+26_{(10)} \quad 000011010$$

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$$\underline{\underline{1}} \Delta 0000011 = \Delta 0111110\Delta_{(SVA)} \quad (CV)$$

$$= - (2^0 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6)$$

$$= \boxed{-127}_{(10)}$$

1,25



2)  $86_{(16)} = 10000110_{(2)}$  donc  $+86 = 010000110_{(CV)}$  <sup>(9 bits)</sup>

$+177_{(8)} = 001111111_{(2)}$  donc  $+177 = 001111111_{(CV)}$  <sup>(9 bits)</sup>

$$\begin{array}{r} +86_{(16)} \quad 010000110 \\ +177_{(8)} \quad 001111111 \\ \hline \underline{\underline{010000101}} \end{array}$$

$86_{(16)} + 177_{(8)} = 134 + 127 = 261_{(16)}$   
 $+261 \notin [-2^8, +2^8 - 1]$

le résultat est incorrect (résultat négatif) car il n'appartient pas au  $[-2^8, +2^8 - 1]$  A

### Exercice 3

1) l'intervalle des nombres normalisés  $[N_{min}, N_{max}]$

$N_{nmax} = \underbrace{0}_{S} \underbrace{11111110}_{E_b} \underbrace{111\dots1}_{f}$  <sup>23 bits</sup>

$E_b = 254 \Rightarrow E_r = E_b - 127 = 254 - 127 = 127$  1,1

$f = 1, f \Rightarrow M = 1,111\dots1 = 2 - 2^{-23}$   
 donc  $N_{nmax} = (2 - 2^{-23}) \times 2^{+127}$

$N_{nmin} = -(2 - 2^{-23}) \times 2^{+127}$

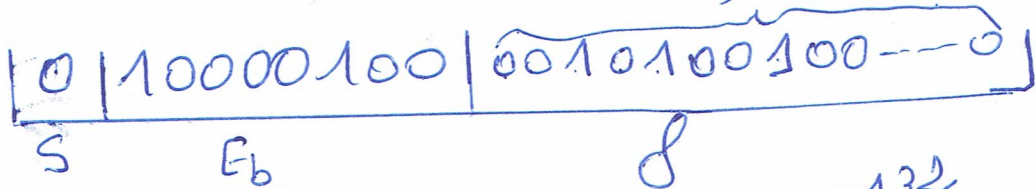
$[-(2 - 2^{-23}) \times 2^{+127}, (2 - 2^{-23}) \times 2^{+127}]$

$$2) \quad 37,125_{(10)} = 100101,00_{(2)}$$

$$\textcircled{A} = 1,0010100_{(2)} \times 2^{+5}$$

$$E_r + 5 \Rightarrow E_b = 5 + 127 = 132 = 10000100_{(2)}$$

donc la représentation de 37,125 en ANSI/IEEE754 est

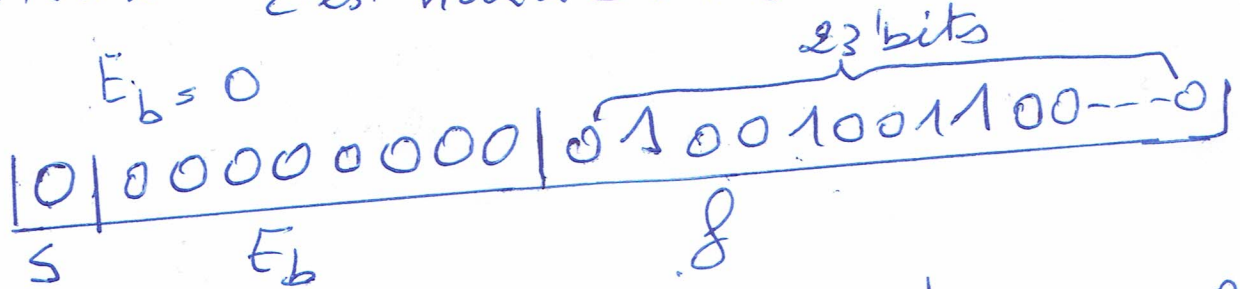


$$\times 18,375 \times 2^{-132} = 10010,011 \times 2^{-132}$$

$$\textcircled{A} = 1,0010011 \times 2^{-128}$$

$$= 0,010010011 \times 2^{-126}$$

$18,375 \times 2^{-132}$  c'est nombre dénormalisé donc



$$3) \quad x = 2003000000_{(8)} = \frac{110000000110000000}{S \quad E_b \quad f}$$

$E_b = 0$  et  $f \neq 0$  donc le nombre est dénormalisé

$$E_r = -126, M = 0,11 = 0,75_{(10)}$$

$$x = -0,75 \times 2^{-126} \quad \textcircled{A}$$

$$y = \frac{1011111010000000000}{S \quad E_b \quad f} \quad \text{normalisé}$$

$$E_b = 0111110_{(2)} = 125_{(10)} \Rightarrow E_r = 125 - 127 = -2$$

$$M = 1,0 \quad \text{donc} \quad y = 1,0 \times 2^{-2} \quad \textcircled{A}$$