Faculté d'Informatique (USTHB) Info – SEC4 – CRI(STRM1)	Nom : …… Prénom : ……	28/11/2022 La durée : 30m

Exercise 1 : (justify each answer)

1- Let A = $76_{(10)}$ and B = $-83_{(10)}$.
(A = $91_{(10)}$ and B = $-72_{(10)}$) (A = $76_{(10)}$ and B = $-83_{(10)}$)

a. Represent A and B in C2 on 8 bits

$A=62_{(10)} = 0011\ 1110_{(c2)}$ $109 = 0110\ 1101_{(c2)}$ $B=-109_{(10)} = 1001\ 0011_{(c2)}$
$A=91_{(10)} = 0101\ 1011_{(c2)}$ $72 = 0100\ 1000_{(c2)}$ $B=-72_{(10)} = 1011\ 1000_{(c2)}$
$A=76_{(10)} = 0100\ 1100_{(c2)}$ $83 = 0101\ 0011_{(c2)}$ $B=-83_{(10)} = 1010\ 1101_{(c2)}$

b. Compute (-A - B) in C2 on 8 bits. Indicate the overflow, carry, and check the result in decimal.

-A –B = c2(62) + 109 = C2(0011 110) + 0110 1101 = $0010\ 1111_{(c2)}$ overflow no, carry yes

-A –B = c2(91) + 72 = C2(0101 1011) + 0100 1000 = $1110\ 1101_{(c2)}$ overflow no, carry no

-A –B = c2(76) + 83 = C2(0100 1100) + 0101 0011 = $0000\ 0111_{(c2)}$ overflow no, carry yes

2- Let A = $100100_{(c2)}$ and B = $(10010100)_{(sm/sva)}$.
(A = $101100_{(c2)}$ and B = $(10001100)_{(sm/sva)}$.) and (A = $110100_{(c2)}$ and B = $(10011100)_{(sm/sva)}$.)
Compute (A+B) in C2 on 8bits. Indicate the overflow, carry, and check the result in decimal.

A = 11100100(c2)= $-28_{(10)}$
B = $10010100_{(sm/sva)}$ = $-0010100_{(2)}$ =-20= c2(00010100) = $11101100_{(c2)}$
A+B = 11100100+11101100 = $11010000_{(c2)}$=$-48_{(10)}$ overflow no, carry yes

A = 11101100(c2)= $-20_{(10)}$
B = $10001100_{(sm/sva)}$ = $-0001100_{(2)}$ =-12= c2(00001100) = $11110100_{(c2)}$
A+B = 11101100+11110100 = $11100000_{(c2)}$=$-32_{(10)}$ overflow no, carry yes

A = 11110100(c2)= $-12_{(10)}$
B = $10011100_{(sm/sva)}$ = $-0011100_{(2)}$ =-28= c2(00011100) = $11100100_{(c2)}$
A+B = 11110100+11100100 = $11011000_{(c2)}$=$-40_{(10)}$ overflow no, carry yes

3- Let A = -110.0110 $_{(2)}$ and B = 0010 0110.0110 0010 $0101_{(BCD)}$.
(A = -100.0110 $_{(2)}$ and B = 0010 0011.0110 0010 $0101_{(BCD)}$.)(A = -101.0110 $_{(2)}$ and B = 0010 1001.0110 0010 $0101_{(BCD)}$.)
Represent A and B in the IEEE 754 standard.

A = -110.0110 = $-1.100110 * 2^2$ s=- m = 0.100110 e = 2 c = 2+127 = 129 = $10000001_{(2)}$…
A = 1 10000001 10011000000000000000000
B = 26.625 = 00011010.101 = $1.1010101*2^4$ s=+ m=0.1010101 e=4 c=4+127 = 131 = 10000011
B = 0 10000011 10101010000000000000000

A = -100.0110 = $-1.000110 * 2^2$ s=- m = 0.000110 e = 2 c = 2+127 = 129 = $10000001_{(2)}$…
A = 1 10000001 00011000000000000000000
B = 23.625 = 00010111.101 = $1.0111101*2^4$ s=+ m=0.0111101 e=4 c=4+127 = 131 = 10000011
B = 0 10000011 01111010000000000000000

A =-101.0110 = $-1.010110 * 2^2$ s=- m = 0.010110 e = 2 c = 2+127 = 129 = $10000001_{(2)}$…
A = 1 10000001 01011000000000000000000
B = 29.625 = 00011101.101 = $1.1101101*2^4$ s=+ m=0.1101101 e=4 c=4+127 = 131 = 10000011
B = 0 10000011 11011010000000000000000

a. Compute (A + B) in the IEEE 754 standard.

A+B = -1.10011 * 2^2 + 110.10101*2^2 = 101.0001*2^2 = 1.010001*2^4
S = + m = 0.010001 e =4 c = 131 = 10000011
A+B = 0 10000011 01000100000000000000000

A+B = -1.000110 * 2^2 + 101.11101*2^2 = 100.1101*2^2 = 1.001101*2^4
S = + m = 0.001101 e =4 c = 131 = 10000011
A+B = 0 10000011 00110100000000000000000

A+B = -1.010110 * 2^2 – 111.01101*2^2 = 110.0001*2^2 = 1.100001*2^4
S = + m = 0.100001 e =4 c = 131 = 10000011
A+B = 0 10000011 10000100000000000000000

4- Let A = 1001 0101 $_{(BCD)}$, B = 10100010$_{(Gray)}$.C = B+2
(A = 1001 0111 $_{(BCD)}$, B = 11000101$_{(Gray)}$)(A = 1001 0000 $_{(BCD)}$, B = 10100101$_{(Gray)}$)

a. Give the value of C without conversion to base 2.
b. Compute (A + B) in BCD.

a) B = 10100010$_{(gray)}$
➔ B+1 = 10100110$_{(gray)}$ (number of 1 is odd)
➔ C=B+2 = 10100111$_{(gray)}$ (number of 1 is even)

b) A=1001 0101$_{(BCD)}$ =95$_{(10)}$ B = 11110011$_{(2)}$ = 143$_{(10)}$=0001 0100 0011 $_{(bcd)}$
A+B = 0010 0011 1000$_{(bcd)}$ = 238$_{(10)}$

a) B = 11000101$_{(gray)}$
➔ B+1 = 11000100$_{(gray)}$ (number of 1 is even)
➔ C=B+2 = 11001100$_{(gray)}$ (number of 1 is odd)

b) A=1001 0111$_{(BCD)}$ =97$_{(10)}$ B = 10100111$_{(2)}$ = 167$_{(10)}$=0001 0110 0111 $_{(bcd)}$
A+B = 0010 0110 0100$_{(bcd)}$ = 264$_{(10)}$

a) B = 10100101$_{(gray)}$
➔ B+1 = 10100100$_{(gray)}$ (number of 1 is odd)
➔ C=B+2 = 10101100$_{(gray)}$ (number of 1 is even)

b) A=1001 0000$_{(BCD)}$ =90$_{(10)}$ B = 11110111$_{(2)}$ = 198$_{(10)}$=0001 1001 1000 $_{(bcd)}$
A+B = 0011 0011 0111$_{(bcd)}$ = 288$_{(10)}$

a) B = 10100101$_{(gray)}$
➔ B+1 = 10100100$_{(gray)}$ (number of 1 is odd)
➔ C=B+2 = 10101100$_{(gray)}$ (number of 1 is even)

b) A=1001 1000$_{(BCD)}$ =90$_{(10)}$ B = 11110111$_{(2)}$ = 198$_{(10)}$=0001 1001 1000 $_{(bcd)}$
A+B = 0011 0011 0111$_{(bcd)}$ = 288$_{(10)}$

5- Sachant que 'A' = 41$_{(16)}$,'a'=61$_{(16)}$, '0' = 30$_{(16)}$ et espace = 20$_{(16)}$.

Donner la codification en ASCII de **votre** date de naissance exemple : « 01 **J**anvier 2000 ».