Homework 1

<u>SUBJECT 1</u>: OPERATIONS

<u>STUDENT 1</u>: CALOTĂ OVIDIU

$b_1 = 8$

$b_2 = 16$

$x = 111650$

$y = 66231$

$z = 55ECC8$

$l = 7$

$X_{(b_1)} + Y_{(b_1)} = S_{(b_1)}$

. . . .

$111650 + 66231 = 200801$

$2_{(b_2)} * l_{(b_2)} = P_{(b_2)}$

. . . .

$55ECC8 * 7 = 2597978$

Homework 1   06/10/2021

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Subject 1

$S = 200101_{(8)}$ $p = 2597978_{(16)}$

$y = 66231_{(8)}$ $f = 7_{(16)}$

the point means we substract the result
from here

$$\begin{array}{c} \overset{1}{2}\ \overset{7}{0}\ \overset{7}{0}\ \overset{8}{1}\ 0\ 1_{(8)} - 66231_{(8)} = 111650_{(8)} \end{array}$$

here, we need 8 because we don't have where to substract from so it looses 1 unit for the other to have 8 from which it can substract

$2597978_{(16)} : 7_{(16)} = ?$

we calculate p in base 10 $\Rightarrow$

$\Rightarrow 2597978_{(16)} = 8 \cdot 16^0 + 7 \cdot 16^1 + 9 \cdot 16^2 + 7 \cdot 16^3 + 9 \cdot 16^4 + 5 \cdot 16^5 + 2 \cdot 16^6 =$

$= 8 + 112 + 2304 + 28672 + 589\ 824 + 5242\ 880 + 33554432 =$

$= 120 + 30976 + 5\ 832\ 704 + 33\ 554\ 432 =$

$= 31\ 096 + 39\ 387\ 136 =$

$= 39\ 418\ 232_{(10)}$

we change bases for f as well $\Rightarrow 7_{(16)} = 7 \cdot 16^0 = 7_{(10)}$

$\Rightarrow 39\ 418\ 232_{(10)} : 7_{(10)} = 5\ 631\ 176_{(10)}$

and now we change the result in base 16

$$\begin{array}{r|ll} 5\ 631\ 176 & 16 \Rightarrow & r & 8 \\ 351\ 948 & 16 \Rightarrow & r & 12\ (c) \\ 21\ 996 & 16 \Rightarrow & r & 12\ (c) \\ 1\ 374 & 16 \Rightarrow & r & 14\ (E) \\ 85 & 16 \Rightarrow & r & 5 \\ 5 & 16 \Rightarrow & r & 5 \\ 0 & & & \end{array}$$

we read the answer from down to up

~~55th~~ $55ECC8_{(16)} = Z_{(16)}$

being the answer

Subject 2

$b = 2$ $h = 16$

the chosen number is

1011 1100 1001 1000 0011, 1010 1111 0010$_{(2)}$ = $BC983, AF2_{(16)}$

$1011 = 2^3 + 2^1 + 2^0 = 8 + 2 + 1 = 11 = B$

$1100 = 2^3 + 2^2 = 8 + 4 = 12 = C$

$1001 = 9$ $0011 = 3$ $1111 = 2^3 + 2^2 + 2 + 1 = 15 = F$

$1000 = 8$ $1010 = 10 = A$ $0010 = 2$

SUBJECT 2 :

$h = 16$

$b = 2$

$Y_{(16)} = BC983, AF2$

$Y_{(2)} = 1011$ 1100 1001 1000 0011 1010 1111 0010

SUBJECT 3

OPTION 1

$x = 11111$

$y = 11222$

$z = 19333$

$[x]_{dir} = 0010\ 1011\ 0110\ 0111$

$[y]_{dir} = 0010\ 1011\ 1101\ 0110$

$[z]_{dir} = 0010\ 1100\ 0100\ 0101$

$[x]_{inv} = 0010\ 1011\ 0110\ 0111$

$[y]_{inv} = 0010\ 1011\ 1101\ 0110$

$[z]_{inv} = 0010\ 1100\ 0100\ 0101$

$[x]_{compl} = 0010\ 1011\ 0110\ 0111$

$[y]_{compl} = 0010\ 1011\ 1101\ 0110$

$[z]_{compl} = 0010\ 1100\ 0100\ 0101$

$-x = -11111$

$-y = -11222$

$-z = -11333$

$[-x]_{dir} = 1101\ 0100\ 1001\ 1001$

$[-y]_{dir} = 1101\ 0100\ 0010\ 1010$

$[-z]_{dir} = 1101\ 0011\ 1011\ 1011$

$[-x]_{inv} = 1101\ 0100\ 1001\ 1000$

$[-y]_{inv} = 1101\ 0100\ 0010\ 1001$

$[-z]_{inv} = 1101\ 0011\ 1011\ 1010$

$[-x]_{compl} = 1101\ 0100\ 1001\ 1001$

$[-y]_{compl} = 1101\ 0100\ 0010\ 1011$

$[-z]_{compl} = 1101\ 0011\ 1011\ 1011$

subject 3 $[x]$ compl = 0010 1011 0110 0111

$[y]$ compl = 0010 1011 1101 0110

$[z]$ compl = 0010 1100 0100 0101

$[-x]$ compl = 1101 0100 1001 1001

$[-y]$ compl = 1101 0100 0010 1011

$[-z]$ compl = 1101 0011 1011 1011   (we remember how
                                         many units we added

$[x+y]$ compl => 0010 1011 0110 0111 +
$[x]$ compl + $[y]$ compl   0010 1011 1101 0110
                  0101 0111 0011 1101

        0101 0111 0011 1101 = 1 + 4 + 8 + 16 + 32 + 256 + 512 + 1024 + 2^{14}

                      16384 =

                      = 22 333

$[x-y]$ compl = $[x+(-y)]$ compl => $[x]$ compl + $[-y]$ compl

        => 0010 1011 0110 0111 +
           1101 0100 0010 1011
           1111 1111 1001 0010

$-(2^1 + 2^4 + 2^7 + 2^8 + 2^9 + 2^{10} + 2^4 + 2^{12} + 2^{13} + 2^{14}) =$
$= (2 + 16 + 128 + 256 + 512 + 1024 + 2048 + 4096 + 8192 + 16384) =$
$= -32658$

$[z-x]$ compl = $[z + (-x)]$ compl => $[z]$ compl + $[-x]$ compl

        0010 1100 0100 0101 +
        1101 0100 1001 1001
      + 0000 0000 1101 1110   (r2)

    => 2 + 4 + 8 + 16 + 64 + 128 = 130 + 80 + 12 = 222

$[-z-x]$ compl => $[(-z) + (-x)]$ compl => $[-z]$ compl + $[-x]$ compl

        1101 0011 1011 1011 +
        1101 0100 1001 1001
      + 1010 1000 0101 0100   (r2) =>

$$-(2^2 + 2^4 + 2^6 + 2^{11} + 2^{13}) = (4 + 16 + 64 + 2048 + 8192) = 10320$$