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Grupa 133
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Examen ASC

1. $x = 125$, $y = 78$

a) $(125)_8 = ?$

$125 : 8 = 15$ rest 5
$15 : 8 = 1$ rest 7
$1 : 8 = 0$ rest 1

$\Rightarrow (125)_8 = (\overline{175})_8$

$(78)_8 = ?$

$78 : 8 = 9$ rest 6
$9 : 8 = 1$ rest 1
$1 : 8 = 0$ rest 1

$\Rightarrow (78)_8 = (\overline{116})_8$

b) $x = (\overline{165})_8^2 = 001\ 111\ 101 = \overline{111101}$

$(\overline{1})_8^2 = 001$

$(\overline{7})_8^2 = 111$

$(\overline{5})_8^2 = 101$

$(111101)_2^{16} = (\overline{7D})_{16} = X$

~~$(1111)_2^{16} = F$~~

(

$(0111)_2^{16} = 7$

$(1101)_2^{16} = $ ~~[illegible]~~ D

$y = (\overline{116})_8^2 = ?$

$(\overline{1})_8^2 = 001$
$(\overline{1})_8^2 = 001$
$(\overline{6})_8^2 = 110$

$\Rightarrow y = (\overline{1001110})_2$

2/11

$y = (\overline{1001110})_2^{16} = ?$

$\left.\begin{array}{l}(\overline{0100})_2^{16} = 4 \\ (\overline{1110})_2^{16} = E\end{array}\right\} \Rightarrow y = (\overline{4E})_{16}$

c) $x = (\overline{175})_8 = (\overline{7D})_{16}$

$y = (\overline{116})_8 = (\overline{4E})_{16}$

$x + y = (\overline{175})_8 + (\overline{116})_8 = (\overline{313})_8$

$x - y = (\overline{7D})_{16} - (\overline{4E})_{16} = (\overline{2F})_{16}$

$$\begin{array}{r} {\scriptstyle 111\ 1} \\ 175 + \\ 116 \\ \hline 313 \end{array} \qquad \begin{array}{r} {\scriptstyle 1} \\ 7D - \\ 4E \\ \hline 2F \end{array}$$

d) $(\overline{313})_8^{-1} = 3 \cdot 8^0 + 1 \cdot 8^1 + 3 \cdot 8^2 = 3 \cdot 1 + 8 + 3 \cdot 64 =$

$= 3 + 8 + 192 = 203$

$(\overline{2F})_{16}^{-1} = F \cdot 16^0 + 2 \cdot 16^1 = 15 \cdot 1 + 2 \cdot 16 =$

$= 15 + 32 = 47$

l) $Z = X - y$ pe 8 biți $\Rightarrow$ mulțimea valorilor este $\{-128, \dots, 127\}$

$x, y \in$ mulțimii de valori și sunt pozitive $\Rightarrow$ le reprezentăm în baza 2 (calculat anterior la le))

$X = \overline{1111101}$

$y = \overline{1001110}$

Calculăm complementul lui y față de 1 apoi 2:

$\Rightarrow$ complementul lui y față de $1 = \overline{0110001} = \overline{110001}$

$\Rightarrow$ complementul lui y față de $2 = \overline{110010}$

Apoi adunăm x la complementul lui y față de 2:

$\overline{1111101} + \overline{110010} = \overline{10101111}$

$$\begin{array}{r} 1111101+ \\ 110010 \\ \hline 10101111 \end{array}$$

$(\overline{10101111})_2^{-1} = 2^0 + 2^1 + 2^2 + 2^3 + 2^5 + 2^7 = 1+2+4+8+32+128 =$

$= 175$

Cel mai semnificativ bit este 1 $\Rightarrow$ avem rezultat negativ

4/11

$\Rightarrow 256 + Z = 175 \Rightarrow Z = 175 - 256 = -81$

f) $0 \times C29A0000$

Format single $\Rightarrow n = 32$

$K = 8 \Rightarrow E_{max} = BIAS = 127$

$\Downarrow$

$E_{min} = -126$

$p = n - K = 24 \Rightarrow |\rho| = 23$ (nr. de cifre al mantisei)

$C = \overline{1100}$

$2 = \overline{0010}$

$9 = \overline{1001}$

$A = \overline{1010}$

$0 = \overline{0000}$

} Reprezentarea în binar ar fi:

1100 0010 1001 1010 0000 0000 0000 0000

C — ρ (mantisa)

$S = 1$

$C = 100\,0010\,1 \Rightarrow$ Sistem în format normalizat

$\Rightarrow X = (-1)^S \cdot 2^E \cdot \overline{1,\rho}$

$E = C - BIAS$

$(C)_2^{-1} = 133$

} $\Rightarrow E = 133 - 127 = 6$

$$(\rho)_2^{-1} = \cancel{0,1000010} = (0,0011010)_2^{-1} = \frac{1}{4} + \frac{1}{16} + \frac{1}{32} =$$

$$= \frac{8+2+1}{32} = \frac{11}{32} =$$

$$= 0,34375$$

$$\Rightarrow x = (-1)^1 \cdot 2^6 \cdot \overline{1,0011010} = (-1) \cdot 64 \cdot 1,34375 =$$

$$= (-1) \cdot 86 = -86 \quad \text{(numărul cerut)}$$

2. a)

Nr. crt	x	y	z	$\bar{x}$	$\bar{y}$	$\bar{z}$	$\bar{x}\bar{z}$	$\bar{y} \oplus z$	f_1	$\bar{x}+y$	$\bar{y} \oplus z$	f_2
(0)	0	0	0	1	1	1	1	1	1	1	1	1
(1)	0	0	1	1	1	0	0	0	0	1	0	0
(2)	0	1	0	1	0	1	1	0	1	1	0	0
(3)	0	1	1	1	0	0	0	1	1	1	1	1
(4)	1	0	0	0	1	1	0	1	1	0	1	0
(5)	1	0	1	0	1	0	0	0	0	0	0	0
(6)	1	1	0	0	0	1	0	0	0	1	0	0
(7)	1	1	1	0	0	0	0	1	1	1	1	1

FNO:

$$f_1 = (0) + (2) + (3) + (4) + (7) =$$

$$= (\bar{x} \cdot \bar{y} \cdot \bar{z}) + (\bar{x} \cdot y \cdot \bar{z}) + (\bar{x} \cdot y \cdot z) + (x \cdot \bar{y} \cdot \bar{z}) + (x \cdot y \cdot z)$$

$$f_{02} = (0) + (3) + (7) =$$

$$= (\bar{x} \cdot \bar{y} \cdot \bar{z}) + (\bar{x} \cdot y \cdot z) + (x \cdot y \cdot z)$$

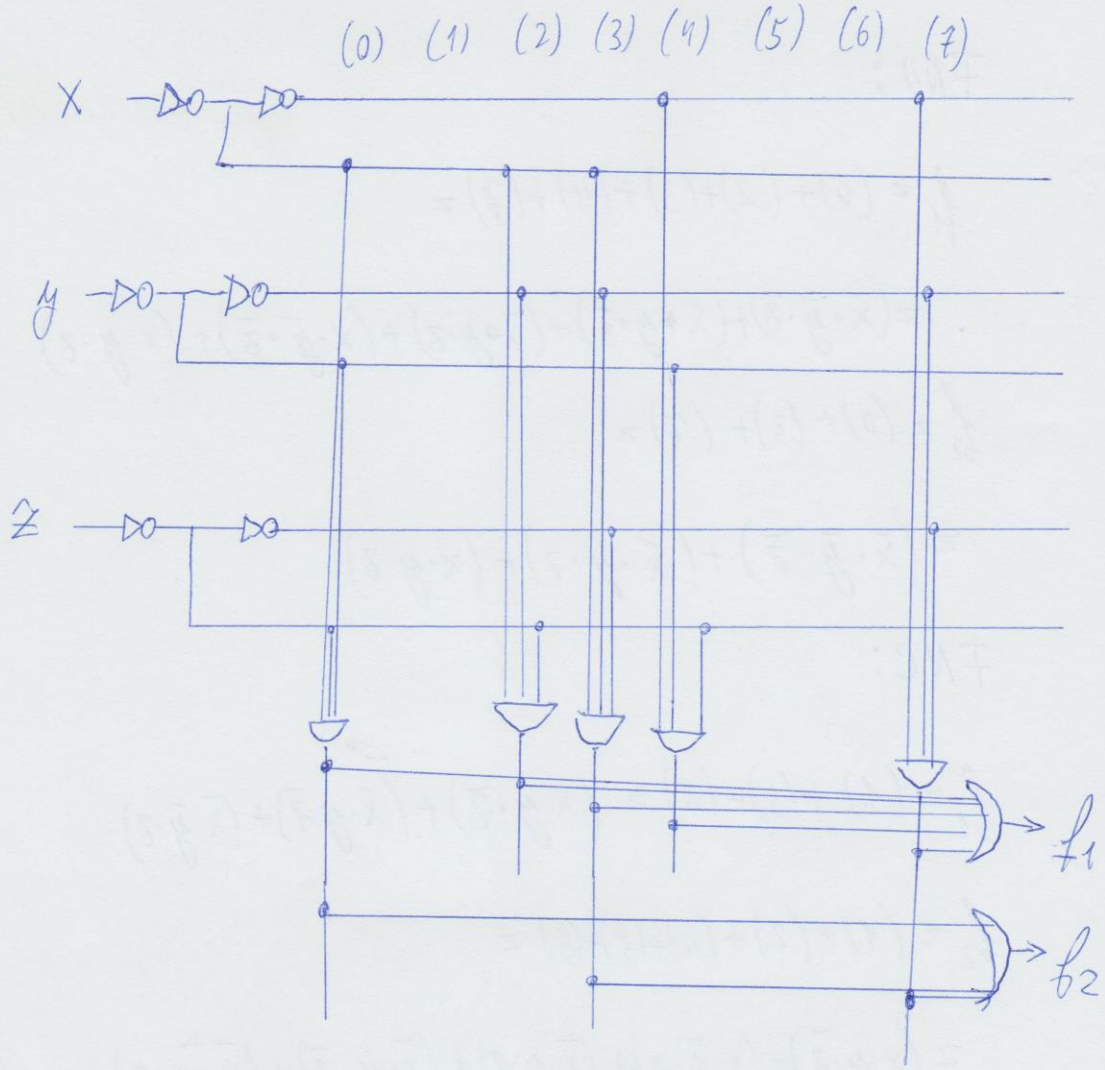
FNC:

$$f_1 = (1) + (5) + (6) = (x \cdot y \cdot \bar{z}) + (\bar{x} \cdot y \cdot \bar{z}) + (\bar{x} \cdot \bar{y} \cdot z)$$

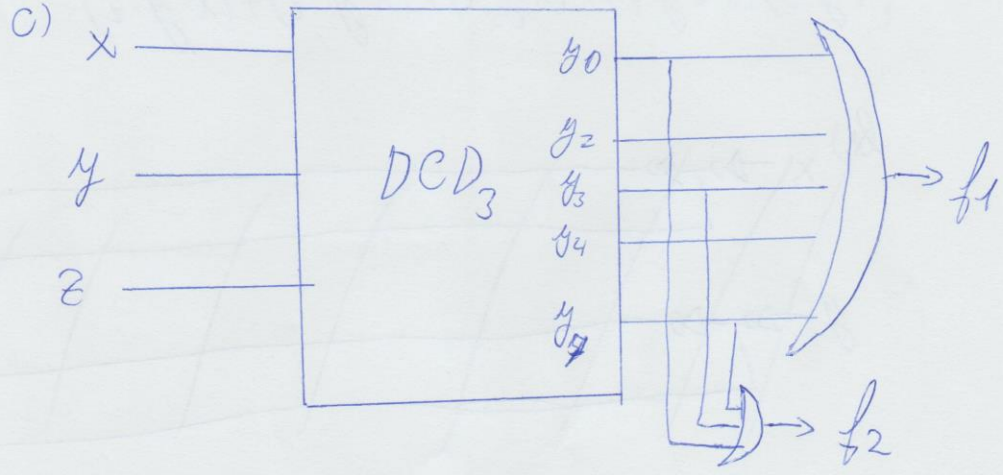
$$f_{02} = (1) + (2) + (4) + (5) + (6) =$$

$$= (x \cdot y \cdot \bar{z}) + (x \cdot \bar{y} \cdot z) + (\bar{x} \cdot y \cdot z) + (\bar{x} \cdot y \cdot \bar{z}) + (\bar{x} \cdot \bar{y} \cdot z)$$

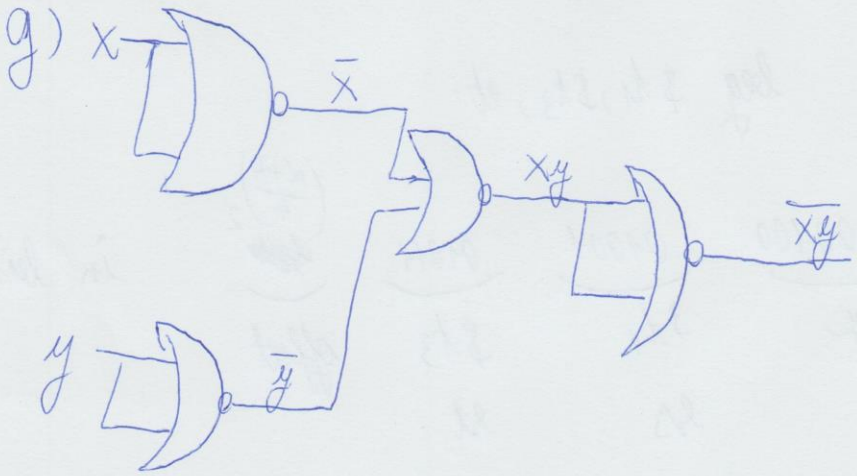
b)



c)



g)



3. a) slt $t3, $t2, $t3

000000	01010	01011	01011	00000	101010
op	rs ($t2)	rt ($t3)	rd ($t3)	shamt	funct

Apoi transform in hexa:

0000	0001	0100	1011	0101	1000	0010	1010
0	1	4	B	5	8	2	A

=> 0143582A

9/11

Pentru beq:

beq $t1, $t3, et

000100	01001	01011	$\left(\frac{\alpha+4}{4}\right)_2$	în binar
op	$t1	$t3	offset	
	rs	rt		

0001	0001	0010	1011	$\left(\frac{\alpha+4}{4}\right)_{16}$
1	1	2	B	

112B... reprezentare hexa, variabilă în funcție de α

b)

	1	4	5	7	8	ALU 3080	10	(d)	(e)	Branch	Mem to Reg
Initial	—	—	—	—	—	—	—	—	—	—	—
slt	α									0	0
beq	$\alpha+4$									1	X
											10/11

	ALU op	ALU Ctrl	Reg Write	PC	$t3	
Initial	—	—	—	α	(-1)	
slt	10	111	1	α	(-1)	
beq	01	110	0	α	?	