Anghelus, Examen Logică matematică
Grima-Cosmina și computațională
10 LF 301

1. a) 1011101, 1011111, 1100001, 1100011, 1100101

b) 111000000, 110111011, 110110110, 110110011, 110101100

2. $1101101_{(2)} + 1011011_{(2)} = 11001000_{(2)}$

$$\begin{array}{r} 1101101_{(2)}+ \\ 1011011_{(2)} \\ \hline 11001000_{(2)} \end{array}$$

$AEF1DC_{(16)} + 9BB1F2_{(16)} = 14AA3CE_{(16)}$

$$\begin{array}{r} AEF1DC_{(16)}+ \\ 9BB1F2_{(16)} \\ \hline 14AA3CE_{(16)} \end{array}$$

$67412_{(8)} - 23567_{(8)} = 43623_{(8)}$

$$\begin{array}{r} 67412_{(8)}- \\ 23567_{(8)} \\ \hline 43623_{(8)} \end{array}$$

$10111000_{(2)} - 11011_{(2)} = 10011101_{(2)}$

$$\begin{array}{r} 10111000_{(2)}- \\ 11011_{(2)} \\ \hline 10011101_{(2)} \end{array}$$

3. $1225.75_{(10)} = ?_{(2)}$

$N = 1225.75_{(10)}$

$[N] = 1225_{(10)}$

$\{N\} = 0,75_{(10)}$

1225	2										
1224	612	2									
$\boxed{1}$	612	306	2								
	$\boxed{0}$	306	153	2							
		$\boxed{0}$	154	76	2						
			$\boxed{1}$	76	38	2					
				$\boxed{0}$	38	19	2				
					$\boxed{0}$	18	9	2			
						$\boxed{1}$	8	4	2		
							$\boxed{1}$	4	2	2	
								$\boxed{0}$	2	1	2
									$\boxed{0}$	0	0
										$\boxed{1}$	

$\Rightarrow 1225_{(10)} = 10011001001$

$\{N\} = 0,75$

$0,75 * 2 = 1,5 = \boxed{1} + 0,5$

$0,5 * 2 = 1,0 = \boxed{1} + 0,0$ = ne oprim

$\Rightarrow \{N\} = 0,11_{(2)}$

$\Rightarrow N = 10011001001,11_{(2)}$

$176,4_{(8)} = ?_{(10)}$

$[N] = 176_{(8)}$ $\qquad$ $10_{(10)} = 12_{(8)}$

$\{N\} = 0,4_{(8)}$

$176_{(8)}$	$12_{(8)}$		
12	14	12	
= 56	12	1	12
50	$\boxed{2}$	0	0
= $\boxed{6}$		$\boxed{1}$	

$\Rightarrow [N] = 126_{(10)}$

$\{N\} = 0,4_{(8)}$

$0,4_{(8)} * 12_{(8)} = 5,00_{(8)} = \boxed{5} + 0,0$ ← stop

$\Rightarrow N = 126,5_{(10)}$

$7654312 6,345_{(8)} = ?_{(2)}$

$8 = 2^{3}$

$\Downarrow$

$7654312 6,345_{(8)} = \underbrace{111}_{7}\underbrace{110}_{6}\underbrace{101}_{5}\underbrace{100}_{4}\underbrace{011}_{3}\underbrace{001}_{1}\underbrace{010}_{2}\underbrace{110}_{6},\underbrace{011}_{3}\underbrace{100}_{4}\underbrace{101}_{5}{}_{(2)}$

$= 111110101100011001010110,011100101_{(2)}$

$1037,532_{(8)} = ?_{(16)}$

$8 = 2^3 \qquad 16 = 2^4$

$1037,532_{(8)} = 001000011111,101011010_{(2)} =$

$= 1000011111,10101101_{(2)}$

$\underbrace{0010}_{=2}\underbrace{0001}_{=1}\underbrace{1111}_{=15},\underbrace{1010}_{=10}\underbrace{1101}_{=13}{}_{(2)} = 217,AD_{(16)}$

4. $[123]_d = [123]_i = [123]_c = 01111011$

$[-98]_d = 11100010$

$$
\begin{array}{r}
[-98]_i = 10011101 + \\
1 \\
\hline
[-98]_c = 10011110
\end{array}
$$

$[+0]_d = [+0]_i = [+0]_c = 00000000$

$[-0]_d = 10000000$

$[-0]_i = 11111111$

$[-0]_c = 00000000$

5. $86 + 27 =$

$[86]_c = 01010110$

$[27]_c = 00011011$

$[86]_c + [27]_c =$

$= 01110001$

$$
\begin{array}{r}
01010110 + \\
00011011 \\
\hline
01110001
\end{array}
$$

transportul de la bitul de semn = 0
tr. către bitul de semn = 0

$\Rightarrow$ corect reprezentat

$[-21]_c + [-124]_c$

$[21]_c = 00010101$

$[-21]_c = 11101011$

$[124]_c = 01111100$

$[-124]_c = 10000100$

```
  11101011 +
  10000100
 ----------
 [1]01101111
```

=> transportul către bitul de semn = 0

transportul de la b.s = 1 / =>

=> nu se poate reprezenta pe 8 biți

$[7]_c * [13]_c = ?$

$[-13]_c = 11110011$

$[7]_c = 00000111$

$[13]_c = 00001101$

M	A	Q	Q_{-1}
00001101	00000000 +	00000111	0
$[-13]_c$	11110011		
	11110011		
→	11111001	10000011	1
→	11111100	11000001	1
→	11111110	01100000	1
[13]	00001101		
	~~1~~00001011		
→	00000101	10110000	0
→	00000010	11011000	0
→	00000001	11101100	0
→	00000000	11110110	0
→	00000000	01111011	0

nr biți = 0 → corect

=> $[7]_c * [13]_c = 01111011$

5. +0

$\underline{0|00000000|000\ldots\ldots0}$

b.s — $\underbrace{00000000}_{\text{exponent}}$ — $\underbrace{000\ldots0}_{23 \text{ de biți } = 0}$

$-1,10101_{(2)} * 2^{6}_{(10)}$ (număr normalizat)

$+0,0101_{(2)} * 2^{-127}_{(10)}$ (număr nenormalizat)

$\underline{0|00000000|1010100\ldots\ldots0}$

b.s.

$-127+127=0$

$\underbrace{0\ldots0}_{19 \text{ biți } = 0}$

$1234,56_{(10)} \approx 10011010010,1000$

$1,00110100101000 \cdot 2^{-10}$

$\underline{0|01110101|10011010010100\ldots0}$

b.s

$-10+127=117$

12 biți 0

$1234 : 2 = 617$ rest $\boxed{0}$; $617 : 2 = 308$ rest $\boxed{1}$; $308 : 2 = 154$ rest $\boxed{0}$; $154 : 2 = 77$ rest $\boxed{0}$; $77 : 2 = 38$ rest $\boxed{1}$; $38 : 2 = 19$ rest $\boxed{0}$; $19 : 2 = 9$ rest $\boxed{1}$; $9 : 2 = 4$ rest $\boxed{1}$; $4 : 2 = 2$ rest $\boxed{0}$; $2 : 2 = 1$ rest $\boxed{0}$; $1 : 2 = 0$ rest $\boxed{1}$

$0,56*2 = 1+0,12$

$0,12*2 = 0+0,24$

$0,24*2 = 0+0,48$

$0,48*2 = 0+0,96$

7. $f(x_1,x_2,x_3,x_4) = \sum m(0,1,2,6,8,9,10,14)$

0000, 0001, 0010, 0110, 1000, 1001, 1010, 1110

$f(x_1,x_2,x_3,x_4) = \bar{x}_1\bar{x}_2\bar{x}_3\bar{x}_4 + \bar{x}_1\bar{x}_2\bar{x}_3x_4 + \bar{x}_1\bar{x}_2x_3\bar{x}_4 + \bar{x}_1x_2x_3\bar{x}_4 + x_1\bar{x}_2\bar{x}_3\bar{x}_4 + x_1\bar{x}_2\bar{x}_3x_4 + x_1\bar{x}_2x_3\bar{x}_4 + x_1x_2x_3\bar{x}_4$

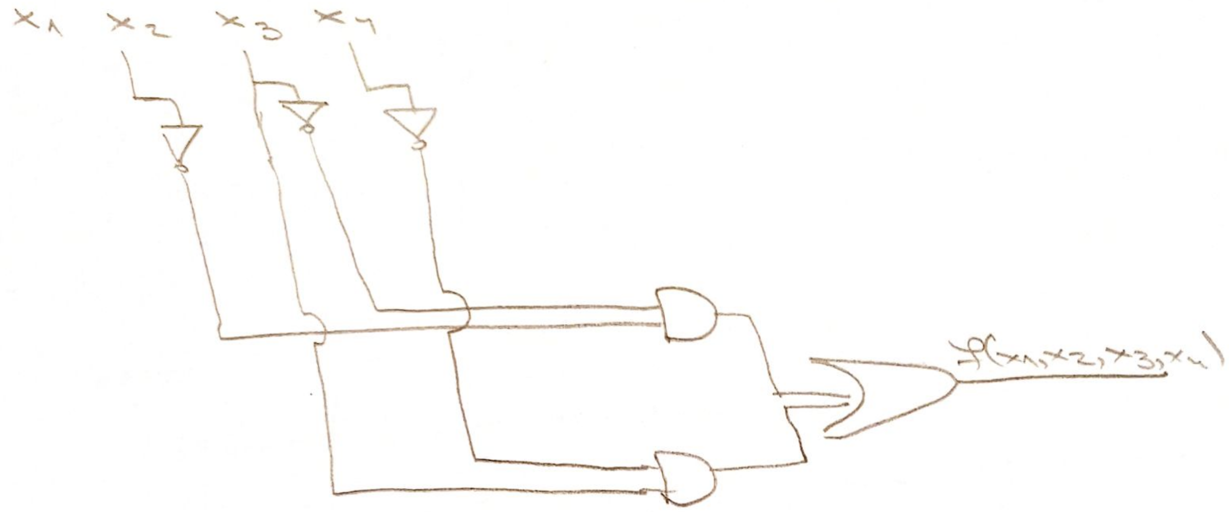
(forma normală disjunctivă)

$x_1x_2 \backslash x_3x_4$	00	01	11	10
00	1	1		1
01				1
11				1
10	1	1		1

$\Rightarrow f(x_1,x_2,x_3,x_4) = \bar{x}_2\bar{x}_3 + x_3\bar{x}_4$

(forma minimală)

circuitul combinatorial corespunzător formei minimale



8. $f(x_1,x_2,x_3)=\sum m(\overset{000}{0},\underset{011}{3},\overset{100}{4},\underset{111}{7})$

$f(x_1,x_2,x_3)=\bar{x}_1\bar{x}_2\bar{x}_3+\bar{x}_1x_2x_3+x_1\bar{x}_2\bar{x}_3+x_1x_2x_3$ (FND)

$\alpha=(1,0,0,1,1,0,0,1)$

$$
\begin{array}{cccccccc}
1 & 0 & 0 & 1 & 1 & 0 & 0 & 1\\
1 & 0 & 1 & 0 & 1 & 0 & 1 & \\
1 & 1 & 1 & 1 & 1 & 1 & & \\
0 & 0 & 0 & 0 & 0 & & & \\
0 & 0 & 0 & 0 & & & & \\
0 & 0 & 0 & & & & & \\
0 & 0 & & & & & & \\
0 & & & & & & &
\end{array} = c
$$

$\Rightarrow c=(1,1,1,0,0,0,0,0)$

$f(x_1,x_2,x_3)=\tilde{\pi}_0\oplus\tilde{\pi}_1\oplus\tilde{\pi}_2=$

$=x_3^0x_2^0x_1^0\oplus x_3^0x_2^0x_1^1\oplus x_3^0x_2^1x_1^0=$

$=1\oplus x_1\oplus x_2$

(expresia Reed-Muller)

polaritate $= 3$

$$\Rightarrow p = 3_{(10)} \rightarrow \overset{x_3\, x_2\, x_1}{0\,1\,1}{}_{(2)} \Rightarrow \begin{cases} x_3 \rightarrow x_3 \\ x_2 \rightarrow \overline{x_2} = x_2 \oplus 1 \\ x_1 \rightarrow \overline{x_1} = x_1 \oplus 1 \end{cases}$$

$$\Rightarrow f(x_1, x_2, x_3) = 1 \oplus (x_1 \oplus 1) \oplus (x_2 \oplus 1) =$$

$$= 1 \oplus x_1 \oplus \cancel{1} \oplus x_2 \oplus \cancel{1} =$$

$$= 1 \oplus x_1 \oplus x_2$$

(expresia Reed - Muller de polaritate 3)

9. $f(x_1, x_2, x_3, x_4) = x_1 \oplus x_2 x_3 \oplus x_4 \oplus x_1 x_2 x_3 \oplus x_1 x_4 \oplus x_1 x_2 x_3 x_4$

polaritate $= 5$

$$\Rightarrow p = 5_{(10)} \rightarrow \overset{x_4\, x_3\, x_2\, x_1}{0\,1\,0\,1}{}_{(2)} \Rightarrow \begin{cases} x_4 \rightarrow x_4 \\ x_3 \rightarrow \overline{x_3} = x_3 \oplus 1 \\ x_2 \rightarrow x_2 \\ x_1 \rightarrow \overline{x_1} = x_1 \oplus 1 \end{cases}$$

$$f(x_1, x_2, x_3, x_4) = (x_1 \oplus 1) \oplus x_2 (x_3 \oplus 1) \oplus x_4 \oplus (x_1 \oplus 1) x_2 (x_3 \oplus 1) \oplus (x_1 \oplus 1) x_4 \oplus (x_1 \oplus 1) x_2 (x_3 \oplus 1) x_4 =$$

$$= x_1 \oplus 1 \oplus \cancel{x_2 x_3} \oplus \cancel{x_2} \oplus \cancel{x_4} \oplus x_1 x_2 x_3 \oplus x_1 x_2 \oplus \cancel{x_2 x_3} \oplus \cancel{x_2} \oplus x_1 x_4 \oplus \cancel{x_4} \oplus x_1 x_2 x_3 x_4 \oplus x_1 x_2 x_4 \oplus x_2 x_3 x_4 \oplus x_2 x_4 =$$

$$= x_1 \oplus 1 \oplus x_1 x_2 x_3 \oplus x_1 x_2 \oplus x_1 x_4 \oplus x_1 x_2 x_3 x_4 \oplus x_1 x_2 x_4 \oplus x_2 x_3 x_4 \oplus x_2 x$$

(expresia Reed - Mullel de polaritate 5)