(1) $11000000 = -128 + 64 = -64$

$10111111 = -128 + 32 + 16 + 8 + 4 + 2 + 1 = -65$

$|-65| + |-64| = 65 + 64 = 129$

$129 : 8 = 16 : 8 = 2 : 8 = 0$

49

$(1) \quad (0) \quad (2)$

$\boxed{Rj: \ 201_{(8)}}$

(2) $(10_2)^2 + (10_8)^2 + (10_{10})^2 + (10_{16})^2 = X_{10}$

$2^2 + 8^2 + 10^2 + 16^2 = 4 + 64 + 100 + 256 = 424$ $\boxed{Rj: 424}$

(3) $f(A,B,C) = \overline{\bar A + \bar B} + \overline{A \cdot \overline{B \cdot \bar C} \cdot \overline{A \bar C}} + B \cdot \overline{BC}$

komplementarna f je $\bar f$

$\overline{f}(A,B,C) = \overline{\overline{\bar A + \bar B} + \overline{A \cdot \overline{B\bar C} \cdot \overline{A \bar C}} + B \cdot \overline{BC}} =$

$= \overline{\overline{\bar A + \bar B}} \cdot \overline{\overline{A \cdot \overline{B\bar C}\, \overline{A\bar C}}} \cdot \overline{B \cdot \overline{BC}} = (\bar A + \bar B) \cdot A \cdot \overline{B\bar C}\, \overline{A\bar C} \cdot (\bar B +$

$= (\bar A + \bar B) \cdot A \cdot (\bar B + C) \cdot (\bar A + C) \cdot (\bar B + BC) = (\cancel{\bar A A} + A\bar B) \cdot (\bar B \bar A + \bar B C + \bar A C + C)$

$\cdot (\bar B + BC) = (A\bar B C + A\bar B C)(\bar B + BC) = A\bar B C(\bar B + BC) =$

$= A\bar B C + \cancel{A\bar B C BC} = A\bar B C$

$\bar f(A,B,C) = A\bar B C$ će biti istina $\Leftrightarrow A = 1 \; \bar B = 1$ i $C = 1$

tj. za $A = 1, B = 0, C = 1$ $\boxed{Rj \ (1, 0, 1)}$

(4) $(x+y)(xy + x + \bar y z) = z(x + y + \bar y x \bar z + z)$

$xy + x + x\bar y z + xy + yx + \cancel{y \bar y z} = zx + zy + \cancel{z \bar y x \bar z} + z$

$x + xy + x\bar y z = z + zx + zy$

$x(\underbrace{1 + y + \bar y z}_{1}) = z(\underbrace{1 + x + y}_{1})$

$x = z \Rightarrow$ može biti 0 i može biti 1

y može biti 0 ili 1

Pa su rješenja

(0, 0, 0)

(0, 1, 0)

(1, 0, 1)

(1, 1, 1)

(5) Imamo 4 različite mogućnosti za $F(A,B,C)$

$F_1(A,B,C)$	$F_2(A,B,C)$	$F_3(A,B,C)$	$F_4(A,B,C)$
0	0	1	1
0	0	0	0
0	0	0	0
0	0	0	0
0	1	0	1
0	0	0	0
0	0	0	0
1	1	1	1

→ vraćamo se u retku s jedinicom do A, B, C i stvaramo izraz

$F_1(A,B,C) = ABC$

$F_2(A,B,C) = A\overline{B}\overline{C} + ABC$

$F_3(A,B,C) = \overline{A}\overline{B}\overline{C} + ABC$

$F_4(A,B,C) = \overline{A}\overline{B}\overline{C} + A\overline{B}\overline{C} + ABC$

(6) $x+2 = 10-3y$ i $y = 5x-8$

$x+2 = 10-3\cdot(5x-8)$

$x+2 = 10-15x+24$

$16x = 34-2$

$16x = 32$

$x = \frac{32}{16}$

$x=2$

$y = 10-8$

$y=2$

Rj $x=2,\ y=2$

(7) $x_8 = 126,27_{(8)} + 64,65_{(8)}$

$$\begin{array}{r} {}^{1\,1\,1\ \ 1} \\ 126,27 \\ 64,65 \\ \hline 213,14 \end{array}$$

baza 8

$\boxed{\text{Rj } 213,14}$

(8) $41_x = 35_y$

41_x => u dekadskom $= 4\cdot x^1 + 1\cdot x^0 = 4x+1$

35_y = -II- $= 3\cdot y^1 + 5\cdot y^0 = 3y+5$

$4x+1 = 3y+5$

$4x = 3y+4$

x, y prirodni pa isprobavamo

$y=1$ $4x = 7$ => x ne može biti prirod

$y=2$ $4x = 10$ -II-

$y=3$ $4x = 13$

$y=4$ $4x = 16$ => $x=4$

Rj $x=4$, $y=4$

(9) ((a>c) ILI (b>c)) i NE (a<b) ILI NE (c>a)

uvrstimo

((1>3) ILI (6>3)) i NE (1<6) ILI NE (3>1) → sada svaku zagradu ocjenim sa ISTINA (1) ili LAŽ (0)

(0 ILI 1) i NE (1) ILI NE 1

1 i 0 ILI 0

0 ILI 0

PRVO

$\boxed{\text{Rj LAŽ}}$

(10) $ABC + AB\bar{C} + A\bar{B}C + A\overline{B+C} + B\overline{(A+C)} + \overline{A+B+C} =$

$= AB(C+\bar{C}) + A\bar{B}C + A\bar{B}\bar{C} + B\bar{A}\bar{C} + \bar{A}\bar{B}\bar{C} =$

$= AB + A\bar{B}(C+\bar{C}) + \bar{A}\bar{C}(B+\bar{B}) = AB + A\bar{B} + \bar{A}\bar{C}$

$= A(B+\bar{B}) + \bar{A}\bar{C} = A + \bar{A}\bar{C} =$ fora sa De Morganom

naopako $= \overline{\bar{A}\cdot(A+C)} = \overline{\bar{A}A + \bar{A}C} = \overline{\bar{A}C} = A+\bar{C}$

pamtimo prvi + zadnji

(11) $AC + \overline{\overline{B\bar{C}}\cdot\overline{A\bar{C}}} + \overline{\bar{B}+\bar{C}} = AC + B\bar{C} + A\bar{C} + BC$

$= A(C+\bar{C}) + B(C+\bar{C}) = A+B$

b) $A+B$ će biti lažan izraz ako je $A=0$ i $B=0$
izraz ne ovisi o C koji može biti i 0 i 1 pa su
rješenja $(0,0,0)$ i $(0,0,1)$

(12) a)

A	B	C	Y	ABC_{10}
0	0	0	0	0
0	0	1	0	1
0	1	0	0	2
0	1	1	1	3
1	0	0	0	4
1	0	1	1	5
1	1	0	0	6
1	1	1	1	7

Y je 1 ako je dekadski ekvivalent (a to je dekadski broj od binarnog broja koje tvori kombinacija sa ulaza) prost broj > 2 (jedino 3, 5 i 7) i u tim retcima je Y = 1

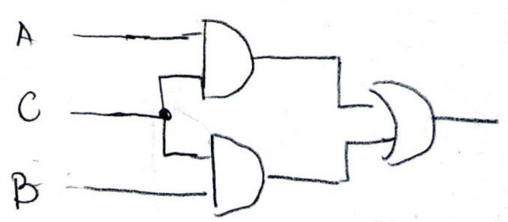
sada pravimo formulu po jedinicama

b) $Y = \bar{A}BC + A\bar{B}C + ABC$

c) $Y = \bar{A}BC + AC(\bar{B}+B) = AC + \bar{A}BC = C(\underbrace{A+\bar{A}B}_{\text{fora}})$

$= C(A+B) = AC+BC$

d)



(13) $13_{(16)} - 12_{(8)} - X_{(10)} - 10_{(2)} = 0$

$X_{(10)} = \overset{16}{1}\overset{1}{3}_{(16)} - \overset{8}{1}\overset{1}{2}_{(8)} - \overset{2}{1}\overset{1}{0}_{(2)}$

$X = 19_{(10)} - 10_{(10)} - 2_{(10)} = 19 - 12 = 7$

$X_{(10)} = 7_{(10)}$

(14) $-0.0625_{(10)}$ u IEEE standardu

$0,0625 \cdot 2 = 0,125$	0
$0.125 \cdot 2 = 0,25$	0
$0.25 \cdot 2 = 0.5$	0
$0.5 \cdot 2 = 1.0$	1

$0,0625_{(10)} = 0,0001_{(2)} = 1,0 \cdot 2^{-4}$

znanstveni oblik

$\underline{-4 + 127} = 123$

123	1
61	1
30	0
15	1
7	1
3	1
1	1
0	

$\boxed{01111011}$

dodala nulu ispred jer treba zauzeti 8 mjesta

Rj: 1 | 01111011 | 0000 | 0000 | 0000 | 0000 | 000

sve su nule (23 kom)

sada to u heksadekadski

BD800000

(15) a) $\overline{AB} \cdot (A + \bar{B}) + \bar{B}(\bar{A}B + \bar{B})$

$\bar{\bar{B}}$

$\bar{B}$ $\bar{B}$

b) $(\bar{A} + \bar{B})(A + \bar{B}) + \cancel{\bar{B}\bar{A}}B + \bar{B}\bar{B} = \cancel{\bar{A}}A + \bar{A}\bar{B} + \bar{B}A + \bar{B}\bar{B} + \cancel{\bar{B}\bar{B}}$

$= \bar{A}\bar{B} + A\bar{B} + \bar{B} = \bar{B}(1 + A + \bar{A}) = \bar{B}$

(16) A = 5 + $\underline{55\ \text{DIV}\ 5}$ * 3 MOD (SQRT(36) − ABS(−2))

A = 5 + 11 * 3 MOD (6 − 2)

A = 5 + 11 * 3 MOD 4

A = 5 + 33 MOD 4 = 5 + 1 = 6

(*, /, DIV, MOD su isl. reda pa idemo s lije na desno)

(17) $p = 12$
$r = 7$
$r = 12 \bmod 7 = 5$ $\qquad r = 5$
$p = p \operatorname{div} r = 12 \operatorname{div} 5 = 2$ $\qquad p = 2$
dok je $3 * p > r$ onda $\quad 6 > 5$ istina
$r = r + p$ $\qquad r = 7$
$p = p - r$ $\qquad p = 2 - 7 = -5$
inače

izlaz $(r + p)$ $\qquad$ Rj $r + p = 7 - 5 = 2$

(18) $\overline{(AB + BC) + A\bar{B}}$ → jednadžba sklopa

$$y = \overline{AB + BC + A\bar{B}} = (\bar{A} + \bar{B}) \cdot (\bar{B} + \bar{C}) \cdot (\bar{A} + B) =$$

$$= (\bar{A}\bar{B} + \bar{A}\bar{C} + \underbrace{\bar{B}\bar{B}}_{\bar{B}} + \bar{B}\bar{C})(\bar{A} + B) = \bar{A}B + \bar{A}\bar{C} + \bar{A}\bar{B} + \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C}$$

$$= \bar{A}B + \bar{A}\bar{C} + \bar{A}\bar{B} + \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} = \bar{A}(\underbrace{B + \bar{C} + \bar{B}}_{1}) + \bar{A}\bar{C}(\bar{B} + B$$

$$= \bar{A} + \bar{A}\bar{C} = \bar{A}(1 + \bar{C}) = \bar{A}$$

$y = \bar{A}$ $\qquad y = 1 \Leftrightarrow A = 0$ $\qquad$ B i C bilo kakvi

Rj
$(0, 0, 0)$
$(0, 0, 1)$ → 4 kombinacije ili 4 uređene trojke
$(0, 1, 0)$
$(0, 1, 1)$

(19)
$$\overline{A + B \cdot C + C} \cdot (\bar{A} \cdot B + C) = \bar{A}(\bar{B} + \bar{C}) \cdot \bar{C} \cdot (\bar{A}B + C$$

$$= \bar{A}\bar{C}(\bar{B} + \bar{C})(\bar{A}B + C) = \bar{A}\bar{C}(\underbrace{\cancel{\bar{A}B\bar{B}}}_{0} + \bar{B}C + \bar{C}\bar{A}B + \underbrace{\cancel{C\bar{C}}}_{0})$$

$$= \underbrace{\cancel{\bar{A}\bar{C}\bar{B}C}}_{0} + \bar{A}\bar{C}\bar{C}\bar{A}B = \bar{A}B\bar{C}$$

(20) A broj → -57
B zapis u MDK → 11000111
C ↓ misli da je MPIAV 11000111
C u dekadski ? $= -71$

57	1
28	0
14	0
7	1
3	1
1	1

00111001
11000110
$\quad\quad\quad\ 1$
$\boxed{1}1000111$ → -57 MD
predznak $\qquad$ broj $= 64 + 4 + 2 + 1$
-71

$\boxed{\text{Rj } -71}$

(21) 2 GB

$\underbrace{1048576}_{1024 \cdot 1024}$ kB zauzeto $= 1024 \cdot \underbrace{1024\ kB}_{MB} = 1024\ MB = 1\ GB$ zauzeto

slike 1024×1024 px svaki px u 8 bita

$$1024 \times 1024 \cdot \underbrace{8\ b}_{1B} = 1 \text{ slika} = 1024 \cdot \underbrace{1024\ B}_{} = 1024\ kB = 1\ MB$$

1 slika = 1 MB

na raspolaganju imamo 1 GB = 1024 MB − 128 MB = 896 MB

Može stati 896 slika

(22) $1024 \cdot 1024$ px svaki pixel ima R G B komponentu = 8 bita = 8 bita = 8 bita

$\Rightarrow$ 1 px = 24 bita

$$1024 \cdot 1024\ px = 1024 \cdot 1024 \cdot 24\ b = 1024 \cdot 1024 \cdot 3 \cdot \underbrace{8\ b}_{B} =$$
$$= 1024 \cdot 1024 \cdot 3\ B = 3 \cdot 1024 \cdot \underbrace{1024\ B}_{kB} = 3 \cdot \underbrace{1024\ kB}_{MB} = 3\ MB$$

(23) 32 kB

fotografija ima $n \times n$ px a svaki px se pamti u 16 bita

$\underbrace{65\ 536}_{2^{16}}$ boja $\Rightarrow$ 1 px $\rightarrow$ 16 bita

$$n \cdot n \cdot 16\ b = 32\ kB$$
$$n^2 \cdot \cancel{16}^{2}\ b = 32 \cdot 1024 \cdot \cancel{8}\ b$$
$$\cancel{2} n^2 = \cancel{32} \cdot 1024$$
$$n^2 = 16 \cdot 1024 = 2^4 \cdot 2^{10} = 2^{14}$$
$$n^2 = 2^{14} = (2^7)^2 \Rightarrow n = 2^7 = 128$$

slika je u rezoluciji $\underline{128 \times 128\ px}$

(24) $v = 128$ kbps $= 128\ 000$ b/s

$t = 2$ min 8 s $= 128$ s

1000 stranica × 64 retka × 64 znakova × 8 bita

$$\underline{1\ str} = 64 \cdot 64 \cdot 8 b = 64 \cdot 64\ B = 2^6 \cdot 2^6\ B = 2^{12}\ B =$$
$$2^2 \cdot 2^{10}\ B = 2^2 \cdot \underline{1024 B} = 2^2\ kB = \underline{4\ kB}$$

za 128 s može se prenijeti $\underline{128} \cdot 128\ 000\ b = 2^7 \cdot 2^7 \cdot 10^3\ b =$

$$= 2^{14} \cdot 10^3\ b = 2^4 \cdot 2^{10} \cdot 10^3\ b = 10^3 \cdot 2^{10} \cdot 2 \cdot \underbrace{2^3 b}_{B} = 10^3 \cdot 2 \cdot 2$$

$= \underline{2\ 000\ kB}$ $\quad n = \dfrac{2000\ kB}{4\ kB} = \boxed{500 \text{ stranica}}$

(25) 1 Mbps / 256 kbps
download = 1 000 000 b/s
t = 7s ⇒ datoteka je velika 7 000 000 b.
modem → najveća brzina 56 kbps = 56 000 b/s

$$\frac{7\ 000\ \cancel{000}\ b}{56\ \cancel{000}\ b}$$

7 000 : 56 = 125 s
140
280
= 0

Preuzela bi se za 125 s

(26) –

(27) $1 < b \leq 10$ $\qquad 3_b^{11_{b-1}} < 2211_{(b+1)}$ $\qquad \boxed{b \geq 3}$

u dekadski !!

$3_b = 3$

$11_{b-1} = 1 \cdot (b-1) + 1 = b - 1 + 1 = b.$

$2211_{b+1} = 2 \cdot (b+1)^3 + 2(b+1)^2 + 1(b+1) + 1(b$
$= 2(b^3 + 3b^2 + 3b + 1) + 2(b^2 + 2b + 1) + b$
$= 2b^3 + 6b^2 + 6b + 2 + 2b^2 + 4b + 2 + b +$
$= 2b^3 + 8b^2 + 11b + 4$

$3^b < 2b^3 + 8b^2 + 11b + 4$
isprobavamo

b = 4
$81 < 2 \cdot 64 + 8 \cdot 16 + 11 \cdot 4 + 4$ istina
b = 5
$243 < 2 \cdot 125 + 8 \cdot 25 + \cdots$

b = 6
$729 < 2 \cdot 216 + 8 \cdot 36 + 11 \cdot 6$
$729 < 790$ ✓
b = 7
$2187 < \cancel{1170}$

$\boxed{b = 4, 5, 6}$

(28) 0 → predznak → +
10000001 → eksponent +127
0011 → decimale
→ $128 + 1 = 129_{10} - 127 = 2$

broj je $+ 1{,}0011 \cdot 2^2$
$= 100{,}11$
$= \boxed{4{,}75}$

(29)

a)

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

barem dva ulaza u stanju 0 i B uvijek 0. (moguće mi 2 ili 3nu)

To su kombinacije

A	B	C
0	0	0
0	0	1
1	0	0

nemanše

b) $Y = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}\bar{C}$

c) $Y = \bar{A}\bar{B}(\bar{C}+C) + A\bar{B}\bar{C} = \bar{A}\bar{B} + A\bar{B}\bar{C} =$

$= \bar{B}(\underbrace{\bar{A} + A\bar{C}}_{\text{fora}}) = \bar{B}(\bar{A}+\bar{C})$

fora $\bar{A}+A\bar{C} = \overline{A\cdot(\bar{A}+C)} = \overline{A\bar{A}+AC} = \overline{AC} = \bar{A}+\bar{C}$

(30) ako $(11>3)$ i $(3>0)$ istina $\Rightarrow$ radimo iza ONDA $\quad 11:3 = 3{,}666$

$X = \text{trunc}(a/b) = \text{trunc}(11/3)$

$= \text{trunc}(3.666) = \boxed{3}$

$(3>10)$ ILI $(10>11)$ LAŽ $\Rightarrow$ radimo iza inače

$X = X + \underbrace{\text{trunc}(\text{sqrt}(10))}_{3}$

sqrt(10) = 3,.....

stari X

$X = 3 + 3 = 6$