Vježbe II

Binarna aritmetika: sabiranje, oduzimanje, množenje, dijeljenje

Pravila sabiranja u binarnom brojnom sistemu:

		Prenos:
0 + 0 =	0	0
0 + 1 =	1	0
1 + 0 =	1	0
1 + 1 =	0	1
1 + 1 + 1 =	1	1

1. Sabrati binarne brojeve i izvršiti provjeru u dekadnom brojnom sistemu.

a)

$$\begin{array}{r} 10110 \\ +\ 11001 \\ \hline 101111 \end{array} \qquad \begin{array}{r} 2^4+2^2+2^1=22_{(10)} \\ +\ 2^4+2^3+2^0=25_{(10)} \\ \hline 2^5+2^3+2^2+2^1+2^0=47_{(10)} \end{array}$$

b)

$$\begin{array}{r} 1101011 \\ +\ 111010 \\ \hline 10100101 \end{array} \qquad \begin{array}{r} 2^6+2^5+2^3+2^1+2^0=107_{(10)} \\ +\ 2^5+2^4+2^3+2^1=58_{(10)} \\ \hline 2^7+2^5+2^2+2^0=165_{(10)} \end{array}$$

c)

$$\begin{array}{r} 1011011.11 \\ +\ 1100111.1 \\ \hline 11000011.01 \end{array} \qquad \begin{array}{r} 2^6+2^4+2^3+2^1+2^0+2^{-1}+2^{-2}=91.75_{(10)} \\ +\ 2^6+2^5+2^2+2^1+2^0+2^{-1}=103.5_{(10)} \\ \hline 2^7+2^6+2^1+2^0+2^{-2}=195.25_{(10)} \end{array}$$

d)

$$\begin{array}{r} 110111.11 \\ +\ 1101101.01 \\ \hline 10100101.00 \end{array} \qquad \begin{array}{r} 2^5+2^4+2^2+2^1+2^0+2^{-1}+2^{-2}=55.75_{(10)} \\ +\ 2^6+2^5+2^3+2^2+2^0+2^{-2}=109.25_{(10)} \\ \hline 2^7+2^5+2^2+2^0=165.00_{(10)} \end{array}$$

2. Izračunati izraz $18_{(10)} - 13_{(10)}$ u binarnom brojnom sistemu.

$$\begin{array}{lr} & 18_{(10)}= \quad 10010_{(2)} \\ - & 13_{(10)}= \quad 01101_{(2)} \\ \hline \text{jedinični komplement} & 10010 \\ & +\quad 1 \\ \hline & 10011 \quad \text{dvojni komplement} \end{array}$$

$$\begin{array}{r|l} & 10010 \\ + & 10011 \\ \hline 1 & 00101 \end{array}$$

pretek $\Rightarrow$ rezultat: $101_{(2)}=5_{(10)}$

***Ako je pretek 1 broj je pozitivan; u suprotnom je negativan. Pretek se ne uzima u obzir kad je u pitanju vrijednost broja!!!

3. Izračunati izraz $30.25_{(10)} - 35.5_{(10)}$ u binarnom brojnom sistemu.

$30.25_{(10)} = 11110.01_{(2)}$
$-\ 35.50_{(10)} = 100011.10_{(2)}$

jedinični komplement 011100.01
$+\ 0.01$
011100.10 dvojni komplement

011110.01
$+\ 011100.10$
$0\,11010.11$ negativan j.k.

000101.00
$+\ 0.01$
$-\ 000101.01$ d.k.

$\Rightarrow$ rezultat: $-101.01_{(2)} = -5.25_{(10)}$

4. Pomnoži brojeve $13_{(10)}$ i $5_{(10)}$ u binarnom brojnom sistemu.

$13_{(10)} = 1101_{(2)}$
$5_{(10)} = 101_{(2)}$

1101×101
1101
0000
$+1101$
$1000001 = 65_{(10)}$

5. Podijeliti brojeve u binarnom brojnom sistemu:
a) $105_{(10)}$ i $6_{(10)}$
b) $21.75_{(10)}$ i $3_{(10)}$

a)

$1101001 : 110 = 10001.1$
-110
01
0
010
0
0100
0
01001
110
110
110
0

b)

$10101.11 : 11 = 111.01$
$-\ 11$
100
11
11
11
01
0
011
11
0