

Lösningförslag till dugga 1 i TMEL53 Digitalteknik 2014-01-23

1a)

$963/2 = 481$	REST 1	LSB
$481/2 = 240$	REST 1	
$240/2 = 120$	REST 0	
$120/2 = 60$	REST 0	
$60/2 = 30$	REST 0	
$30/2 = 15$	REST 0	
$15/2 = 7$	REST 1	"LÄSRIKTNING"
$7/2 = 3$	REST 1	
$3/2 = 1$	REST 1	↑
$1/2 = 0$	REST 1	MSB

ALLTSA $963 = 1111000011$
10 2

b)

$963 = 100101100011$
10 NBCD

$\underbrace{\quad\quad\quad}_9 \quad \underbrace{\quad\quad}_6 \quad \underbrace{\quad\quad}_3$

2a)

$101001001101 = A4D$
2 16

$\underbrace{\quad\quad\quad}_A \quad \underbrace{\quad\quad}_4 \quad \underbrace{\quad\quad}_D$

b)

$101001001101 = 5115$
2 8

$\underbrace{\quad\quad}_5 \quad \underbrace{\quad}_1 \quad \underbrace{\quad}_1 \quad \underbrace{\quad}_5$

3a) DIVISION MED FYRA INNEBÄR TVÅ HÖGER-SKIFT AV DET BINÄRA TALET →

$0010,1100$ DIVIDERAT MED FYRA = $0000,1011$
2 2

$$3b) \quad 0000,1011_2 = 2^{-1} + 2^{-3} + 2^{-4} =$$

$$= 0,5 + 0,125 + 0,0625 = 0,6875_{10}$$

$$4a) \quad \begin{array}{r} 1110011 \quad \leftarrow 115 \\ \cdot \quad 1101 \quad \leftarrow 13 \\ \hline 1111111 \\ 1110011 \\ 0000000 \\ 1110011 \\ + 1110011 \\ \hline 10111010111 \quad \leftarrow 1495 \end{array}$$

$$4b) \quad \begin{array}{r} \overset{75_{10}}{1110011} \quad \leftarrow 115 \\ - \quad 1101 \quad \leftarrow 13 \\ \hline 1100110 \quad \leftarrow 102 \end{array}$$

$$5a) \quad \begin{array}{l} 0,8750 \cdot 2 = 0,75 + 1 \quad \text{MSB} \\ 0,75 \cdot 2 = 0,5 + 1 \\ 0,5 \cdot 2 = 0 + 1 \quad \text{LSB} \end{array} \quad \begin{array}{l} \downarrow \\ \text{LÄSRIKTNING} \end{array}$$

$$+ 0,8750_{10} = 0000,1110_2$$

TECKENBIT, 0 BETYDER PLUS

$$\begin{array}{r} \text{INVERTERA} \quad 1111,0001 \\ \text{ADDERA } 1 \quad + \quad 1 \\ \hline \end{array}$$

$$- 0,8750 \rightarrow 1111,0010$$

ENLIGT 2-KOMPLEMENTMETODEN

TECKENBIT, 1 BETYDER MINUS

$$\text{ALLTSA } -0,8750_{10} = 1111,0010_2$$

$$5b) \quad 0,6875_{10} = 0000,1011_2$$

ENLIGT UPPGIFT 3b

$$\text{ALLTSÅ } 0,6875_{10} - 0,8750_{10} =$$

$$= 0000,1011_2 + 1111,0010_2$$

$$\begin{array}{r} 0000,1011 \quad \leftarrow 0,6875 \\ + 1111,0010 \quad \leftarrow -0,8750 \\ \hline 1111,1101 \quad \leftarrow -0,1875 ? \end{array}$$

KONTROLL:

$$\begin{array}{r} 1111,1101 \\ - \quad \quad \quad 1 \quad \text{SUBTRAHERA 1} \\ \hline 1111,1100 \\ 0000,0011 \quad \text{INVERTERA} \end{array}$$

$$0000,0011_2 = 2^{-3} + 2^{-4} = +0,1875_{10}$$

$$\text{ALLTSÅ } 1111,1101_2 = -0,1875_{10}$$