

Computational Logic

Subject 1: Operations (Iakkab)

$$b_1 = 6$$

$$b_2 = 16$$

$$x = 201235$$

$$y = 11342$$

$$z = 108794$$

$$f = 3$$

$$\star x_{(b_1)} + y_{(b_1)} = S_{(b_1)}$$

$$201235_{(6)} + 11342_{(6)} = S_{(6)}$$

$$\begin{array}{r}
 201235_{(6)} + \\
 11342_{(6)} \\
 \hline
 213021_{(6)}
 \end{array}$$

$$\Rightarrow 201235_{(6)} + 11342_{(6)} = 213021_{(6)} = S_{(6)}$$

Intermediate calculations

$5_{(10)} + 2_{(10)} = 7_{(10)} = 1\Phi_{(6)}$	$(1 \times 6 + 1)$
$3_{(10)} + 4_{(10)} = 7_{(10)} = 11_{(6)}$	$(1 \times 6 + 1)$
$2_{(10)} + 3_{(10)} = 5_{(10)} = 5_{(6)}$	$(0 \times 6 + 5)$
$1_{(10)} + 1_{(10)} = 2_{(10)} = 2_{(6)}$	$(0 \times 6 + 2)$
$0_{(10)} + 1_{(10)} = 1_{(10)} = 1_{(6)}$	$(0 \times 6 + 1)$
$2_{(10)} + 0_{(10)} = 2_{(10)} = 2_{(6)}$	$(0 \times 6 + 2)$

$$\circ \quad e_{(b_2)} * f_{(b_2)} = p_{(b_2)}$$

$$10B794_{(16)} * 3_{(16)} = P_{(16)}$$

$$\begin{array}{r} 2 \quad 1 \quad 1 \\ 1 \quad 0 \quad B \quad 7 \quad 9 \quad 4_{(16)} \times \\ \hline 3 \quad 2 \quad 2 \quad 6 \quad B \quad C_{(16)} \end{array}$$

$$\Rightarrow 10B794_{(16)} * 3_{(16)} = 3226BC_{(16)} = P_{(16)}$$

Intermediate calculations

$$3_{(10)} \times 4_{(10)} = 12_{(10)} = C_{(16)}$$

$$3_{(10)} \times 9_{(10)} = 27_{(10)} = 16 \times 1 + 11 \Rightarrow \text{carry} = 1; \text{result} = 11 = B_{(16)}$$

$$3_{(10)} \times 7_{(10)} = 21_{(10)} = 16 \times 1 + 5 \Rightarrow \text{carry} = 1; \text{result} = 5_{(16)}$$

$$B = 11 \Rightarrow 3_{(10)} \times 11_{(10)} = 33_{(10)} = 16 \times 2 + 1 \Rightarrow \text{carry} = 2; \text{result} = 1_{(16)}$$

$$3_{(10)} \times 0_{(10)} = 0_{(10)} = 16 \times 0 + 0 \Rightarrow \text{carry} = 0; \text{result} = 0_{(16)}$$

$$3_{(10)} \times 1_{(10)} = 3_{(10)} = 16 \times 0 + 3 \Rightarrow \text{carry} = 0; \text{result} = 3_{(16)}$$

Student 2

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Computational logic
Homework - teams

Subject 1: operations

I received from Student 1:

$$b_1 = 6$$

$$b_2 = 16$$

$$\Delta = 013021(6)$$

$$\gamma = 11342(6)$$

$$\rho = 3226BC(16)$$

$$\varphi = 3(16)$$

First exercise:

$$\Delta(b_1) - \gamma(b_1) = ? (b_1)$$

$$\begin{array}{r} 0^0 - 1^1 - 1^0 \\ 213021(6) - \\ 11342(6) \\ \hline 201235(6) \end{array}$$

$$\text{it 1: } 0(6) + 1(6) - 2(6) = 0 + 1 - 2 = -1 < 0 \Rightarrow$$

$$\Rightarrow \begin{cases} -1 + 6 = 5 \\ b = -1 \end{cases}$$

$$\text{it 2: } (-1)(6) + 2(6) - 4(6) = -1 + 2 - 4 = -3 < 0 \Rightarrow$$

$$\Rightarrow \begin{cases} -3 + 6 = 3 \\ b = -1 \end{cases}$$

$$\text{it 3: } (-1)(6) + 0(6) - 3(6) = -1 + 0 - 3 = -4 < 0 \Rightarrow$$

$$\Rightarrow \begin{cases} -4 + 6 = 2 \\ b = -1 \end{cases}$$

$$\text{it 4: } (-1)(6) + 3(6) - 1(6) = -1 + 3 - 1 = 1 \geq 0 \Rightarrow$$

$$\Rightarrow b=0$$

$$\text{it 5: } 0(6) + 1(6) - 1(6) = 0 + 1 - 1 = 0 \geq 0 \Rightarrow b=0$$

$$\text{it 6: } 0(6) + 2(6) - 0(6) = 0 + 2 - 0 = 2 \geq 2 \Rightarrow$$

$$\Rightarrow b=0$$

$$213021(6) - 11342(6) = 201235(6)$$

Second exercise:

$$P(b_2), f(b_2) = ?(b_2)$$

$$\begin{array}{r} 3226BC(16) | 3(16) \\ \hline \overline{02} \quad \quad \quad \overline{10B794} \\ \hline \overline{1} \\ \hline \overline{22} \\ \hline \overline{1} \\ \hline \overline{16} \\ \hline \overline{1} \\ \hline \overline{0} \\ \hline \overline{9} \\ \hline \overline{10} \end{array}$$

$$3226BC(16) : 3(16) = 10B794(16) \text{ R } 0$$

10 remainder

$$3 \text{ div } 3 = 1$$

$$\text{it 1: } 03(16) = 0 * 16 + 3 = 3 \quad 3 \% 3 = 0$$

$$\text{it 2: } 02(16) = 0 * 16 + 2 = 2 \quad 2 \% 3 = 0$$

$$\text{it 3: } 22(16) = 2 * 16 + 2 = 34 \quad 34 \% 3 = 1$$

$$\text{it 4: } 16(16) = 1 * 16 + 6 = 22 \quad 22 \% 3 = 1$$

$$\text{it 5: } 1B(16) = 1 * 16 + 11 = 27 \quad 27 \% 3 = 0$$

$$\text{it 6: } 0C(16) = 0 * 16 + 12 = 12 \quad 12 \% 3 = 0$$

Student 2

Subject 2: conversions of real numbers
choosing the appropriate methods

$$b = 5$$

$$h = 9$$

$$x(5) = 13423,112(5)$$

$$x(5) = ?(9)$$

$b = 5 < h = 9 \Rightarrow$ all the digits in base 5 remain the same in base 9

$$1(5) = 1(9)$$

$$2(5) = 2(9)$$

$$3(5) = 3(9)$$

$$4(5) = 4(9)$$

$$13423,112 = 1(9) * 5(9)^4 + 3(9) * 5(9)^3 + 4(9) * 5(9)^2 + 2(9) * 5(9)^1 + 3(9) * 5(9)^0 + 1(9) * 5(9)^{-1} + 1(9) * 5(9)^{-2} + 2(9) * 5(9)^{-3}$$

$$\text{it 1: } 5(9)^2 = 5(9) * 5(9) = \underline{\underline{27(9)}}$$

$$c \frac{2}{5} \quad \text{it 2: } 5(9) * 5(9) = 5 \cdot 5 = 25$$

$$\frac{5}{27} \quad 25/9 = 2,25 \cdot 9 = 7$$

$$\begin{aligned} \text{it 2: } 5(9)^3 &= 5(9) * 5(9) = 27(9) * 5(9) = \underline{\underline{148(9)}} \\ c \frac{1}{5} \frac{3}{27} &\star \\ \hline 148 \end{aligned}$$

$$\text{d 2.1: } 7(9) \cdot 6(9) = 7 \cdot 5 = 35$$

$$35/9 = 3, 35\% 9 = 8$$

$$\text{d 2.2: } 2(9) \cdot 6(9) + 3(9) = 2 \cdot 5 + 3 = 13$$

$$13/9 = 1, 13\% 9 = 4$$

$$\text{c 3: } 5(9)^4 = 5(9)^3 \cdot 5(9) = 125(9) \cdot 5(9) = \boxed{625(9)}$$

$$\begin{array}{r} 2+9 \\ \hline 148 \\ \hline 5 \\ \hline 764 \end{array}$$

$$\text{d 3.1: } 8(9) \cdot 5(9) = 8 \cdot 5 = 40$$

$$40/9 = 4, 40\% 9 = 4$$

$$\text{d 3.2: } 4(9) \cdot 5(9) + 4(9) = 4 \cdot 5 + 4 = 24$$

$$24/9 = 2, 24\% 9 = 6$$

$$\text{d 3.3: } 1(9) \cdot 5(9) + 2(9) = 5 + 2 = 7$$

$$7/9 = 0, 7\% 9 = 7$$

$$\text{d 4: } 1(9) \cdot 5(9)^4 = 1(9) \cdot 625(9) = \boxed{625(9)}$$

$$\begin{array}{r} 625 \\ \hline 1 \\ \hline 625 \end{array}$$

$$\text{d 4.1: } 1(9) \cdot 4(9) = 1 \cdot 4 = 4$$

$$4/9 = 0, 4\% 9 = 4$$

$$\text{d 4.2: } 6(9) \cdot 1(9) = 6 \cdot 1 = 6$$

$$6/9 = 0, 6\% 9 = 6$$

$$\text{d 4.3: } 7(9) \cdot 1(9) = 7 \cdot 1 = 7$$

$$7/9 = 0, 7\% 9 = 7$$

$$\text{it 5: } 3(9) \cdot 5(9)^3 = 3(9) \cdot 148(9) = \boxed{456(9)}$$
$$\begin{array}{r} 148 \\ \times 3 \\ \hline 456 \end{array}$$

$$\text{it 5.1: } 8(9) \cdot 3(9) = 8 \cdot 3 = 24$$

$$24/9 = 2, 22\% 9 = 6$$

$$\text{it 5.2: } 4(9) \cdot 3(9) + 2(9) = 4 \cdot 3 + 2 = 14$$
$$14/9 = 1, 14\% 9 = 5.$$

$$\text{it 5.3: } 1(9) \cdot 3(9) + 1(9) = 1 \cdot 3 + 1 = 4$$
$$4/9 = 0, 4\% 9 = 4$$

$$\text{it 6: } 4(9) \cdot 5(9)^2 = 4(9) \cdot 27(9) = \boxed{121(9)}$$
$$\begin{array}{r} 27 \\ \times 4 \\ \hline 121 \end{array}$$

$$\text{it 6.1: } 7(9) \cdot 4(9) = 7 \cdot 4 = 28$$
$$28/9 = 3, 28\% 9 = 1$$

$$\text{it 6.2: } 2(9) \cdot 4(9) + 3(9) = 2 \cdot 4 + 3 = 11$$
$$11/9 = 1, 11\% 9 = 2$$

$$\text{it 6.3: } 1(9) + 0(9) \cdot 0(9) = 1$$
$$1/9 = 0, 1\% 9 = 1$$

$$\text{it 7: } 2(9) \cdot 5(9) = \boxed{11(9)}$$
$$\begin{array}{r} 5 \\ \times 2 \\ \hline 11 \end{array}$$

$$\text{it 7.1: } 2(9) \cdot 5(9) = 2 \cdot 5 = 10$$

$$10/9 = 1, 10\% 9 = 1$$

$$\text{it 7.2: } 1(9) + 0(9) \cdot 0(9) = 1 + 0 = 1$$
$$1/9 = 0, 1\% 9 = 1$$

$$d8: 1(9) \cdot 5(9)^{-1} = \boxed{0,171(9)}$$

$$\begin{array}{r} 1,000(9) \mid 5(9) \\ \hline 10 \\ \hline 40 \\ \hline 10 \\ \hline 4 \end{array}$$

$$d8.1: 01(9) = 0 \cdot 9 + 1 = 1$$

$$1/5=0; 10/5=1$$

$$d8.2: 10(9) = 1 \cdot 9 + 0 = 9$$

$$5/5=1, 9\%5=4$$

$$d8.3: 40(9) = 4 \cdot 9 + 0 = 36$$

$$36/5=7, 36\%5=1$$

$$d8.4: 10(9) = 1 \cdot 9 + 0 = 9$$

$$5/5=1, 9\%5=4$$

$$d9: 1(9) \cdot 5(9)^{-2} = 1(9) \cdot 5(9)^{-1} \cdot 5(9)^{-1} = 0,171 \cdot 5(9)^{-1}$$

$$\begin{array}{r} 0,171(9) \mid 5(9) \\ \hline 01 \\ \hline 17 \\ \hline 11 \\ \hline 0 \end{array}$$

$$\text{if 9.1: } 0(9) = 0 \cdot 9 = 0$$
$$0/5 = 0, 0\% 5 = 0$$

$$\text{if 9.2: } 01(9) = 0 \cdot 9 + 1 = 1$$
$$1/5 = 0, 1\% 5 = 1$$

$$\text{if 9.3: } 12(9) = 1 \cdot 9 + 2 = 16$$
$$16/5 = 3, 16\% 5 = 1$$

$$\text{if 9.4: } 11(9) = 1 \cdot 9 + 1 = 10$$
$$10/5 = 2, 10\% 5 = 0$$

$$\text{if 10: } 2(9) \cdot 5(9)^{-3} = 2(9) \cdot 5(9)^{-1} \cdot 5(9)^{-2}$$
$$\begin{array}{r} 2,000(9) \\ \times \quad \quad | 5(9) \\ \hline 0,353 \\ \hline \end{array}$$
$$\begin{array}{r} 2 \\ \hline 20 \\ \hline 30 \\ \hline 1 \\ \hline 20 \\ \hline 3 \end{array}$$

$$\text{if 10.1: } 02(9) = 0 \cdot 9 + 2 = 2$$
$$2/5 = 0, 2\% 5 = 2$$

$$\text{if 10.2: } 20 = 2 \cdot 9 + 0 = 18$$
$$18/5 = 3, 18\% 5 = 3$$

$$\text{if 10.3: } 30 = 3 \cdot 9 + 0 = 27$$
$$27/5 = 5, 27\% 5 = 2$$

~~if 10 becomes: 2f~~

$$\text{if 10.4: } 20 = 2 \cdot 9 + 0 = 18$$
$$18/5 = 3, 18\% 5 = 3$$

$$\text{if 10 becomes: } 0,353(9) \cdot 5(9)^{-2}$$

$$0,353(9) \overline{) 5(5)}$$

$$\begin{array}{r} 1 \\ 03 \\ \hline 35 \\ \hline 23 \\ \hline 1 \end{array}$$

i) at 10.5: $0.9+0=0$

$$0/5=0, 0\%5=0$$

at 10.6: $03 = 0.9 + 3 = 3$

$$3/5=0, 3\%5=3$$

at 10.7: $35 = 3.9 + 5 = 32$

$$32/5=6, 32\%5=2$$

at 10.8: $23 = 2.9 + 3 = 21$

$$21/5=4, 21\%5=1$$

at 10 becomes: $0,064(9).5(5)^{-1}$

$$0,064(9) \overline{) 5(5)}$$

$$\begin{array}{r} 1 \\ 00 \\ \hline 06 \\ \hline 14 \\ \hline 3 \end{array}$$

$$\text{if 10. } 9 : 0 = 0 \cdot 9 = 0$$

$$0/5=0, 0\%5=0$$

$$\text{if 10. } 10 : 0 = 0 \cdot 9 = 0$$

$$0/5=0, 0\%5=0$$

$$\text{if 10. } 11 : 06 = 0 \cdot 9 + 6 = 6$$

$$6/5=1, 6\%5=1$$

$$\text{if 10. } 12 : 14 = 1 \cdot 9 + 4 = 13$$

$$13/5=2, 13\%5=3$$

$$2(9) \cdot 5(9)^{-3} = \boxed{0,012(9)}$$

$$13423,112(9) = 764(9) + 456(9) + 121(9) + 11(9) + 0,012(9)$$
$$+ 0,032(9) + 0,012(9)$$

$$\begin{array}{r} 1110 \\ 764,000 \\ 456,000 \\ 121,000 \\ 11,000 \\ 8,991 \\ 0,032 \\ 0,012 \\ \hline 1456,225 \end{array}$$

$$\text{if 11. } 1 : 0(9) + 0(9) + 0(9) + 0(9) + 0(9) + 1(9) + 2(9) + 2(9) =$$
$$= 0 + 0 + 0 + 0 + 1 + 2 + 2 = 5 \quad 5/9 = 0$$
$$5\%9 = 5$$

$$\text{if 11. } 2 : 0(9) + 0(9) + 0(9) + 0(9) + 0(9) + 7(9) + 3(9) + 1(9) =$$
$$= 0 + 0 + 0 + 0 + 0 + 7 + 3 + 1 = 11 \quad 11/5 = 1$$
$$11\%9 = 2$$

$$\text{at 11.3: } 1(g) + 0(g) + 0(g) + 0(g) + 0(g) + 0(g) =$$

$$= 1 + 0 + 0 + 0 + 1 + 0 + 0 = 2 \quad < \frac{+2}{2} g = 0$$

$$\text{at 11.4: } 0(g) + 4(g) + 6(g) + 1(g) + 1(g) + 0(g) + 0(g) =$$

$$= 0 + 4 + 6 + 1 + 1 + 0 + 0 = 15 \quad < \frac{15}{15} g = 1$$

$$\text{at 11.5: } 1(g) + 6(g) + 5(g) + 2(g) + 6 + 5 + 24 = 15 \quad < \frac{15}{15} g = 1$$

$$\text{at 11.6: } 1(g) + 7(g) + 4(g) + 1(g) = 1 + 7 + 4 + 1 = 13 \quad < \frac{13}{13} g = 1$$

$$\text{at 11.7: } 1(g) + 0(g) = 1(g) \quad < \frac{1}{1} g = 1$$

$$* 3423, 112(5) = 1466225(g)$$

Ex

①

②

Subject 2: Conversions (Iakab Stud. 1)

$$b = 5$$

$$h = 9$$

$$y = 1466,256_{(9)}$$

Integer part

$1466_{(9)}$	$\div 5_{(9)}$	$266_{(9)}$	$\div 5_{(9)}$	$48_{(9)}$	$\div 5_{(9)}$	$8_{(9)}$	$\div 5_{(9)}$	$1_{(9)}$	$\div 5_{(9)}$
14	266	26	48	48	8	8	1	1	0
36		46		4		3		1	
36			2						
	3								

Intermediate calculations

$$\begin{aligned}
 14(q) &= 1 \times q + 4 = 13; \quad 13/5 = 2; \quad 13 \% 5 = 3 \\
 36(q) &= 3 \times q + 6 = 33; \quad 33/5 = 6; \quad 33 \% 5 = 3 \\
 26(q) &= 2 \times q + 6 = 24; \quad 24/5 = 4; \quad 24 \% 5 = 4 \\
 46(q) &= 4 \times q + 6 = 42; \quad 42/5 = 8; \quad 42 \% 5 = 2 \\
 48(q) &= 4 \times q + 8 = 44; \quad 44/5 = 8; \quad 44 \% 5 = 4 \\
 8(q) &= 0 \times q + 8 = 8; \quad 8/5 = 1; \quad 8 \% 5 = 3 \\
 1(q) &= 0 \times q + 1 = 1; \quad 1/5 = 0; \quad 1 \% 5 = 1
 \end{aligned}$$

$$\Rightarrow 1466_{(q)} = 13423_{(5)}$$

Fractional part

0	2	5	6	x	0	2	8	x	0	4	x
		S			S		S			S	
	1	2	8		1	3		2			

↳ Fractional part is 0

$$\Rightarrow 0,256_{(q)} = 0,112_{(5)}$$

$$\Rightarrow 1466,256_{(q)} = 13423,112_{(5)}$$

Subject 3: Representations (Fakultät stud. I)

Option 2

$n = 16$ bits

$x = 0,3011$

$y = 0,4312$

$z = 0,692$

$$\bullet 0,3011 = 0,010011010001010$$

Intermediate calculations

$$0,3011 \times 2 = 0,6022$$

$$0,6022 \times 2 = 1,2044$$

$$0,2044 \times 2 = 0,4088$$

$$0,4088 \times 2 = 0,8176$$

$$0,8176 \times 2 = 1,6352$$

$$0,6352 \times 2 = 1,2704$$

$$0,2704 \times 2 = 0,5408$$

$$0,5408 \times 2 = 1,0816$$

$$0,0816 \times 2 = 0,1632$$

$$0,1632 \times 2 = 0,3264$$

$$0,3264 \times 2 = 0,6528$$

$$0,6528 \times 2 = 1,3056$$

$$0,3056 \times 2 = 0,6112$$

$$0,6112 \times 2 = 1,2224$$

$$0,2224 \times 2 = 0,4448$$

$$\bullet 0,4312 = 0,01101100110001$$

Intermediate calculations

$$0,4312 \times 2 = 0,8624$$

$$0,8624 \times 2 = 1,7248$$

$$0,7248 \times 2 = 1,4496$$

$$0,4496 \times 2 = 0,8892$$

$$0,8892 \times 2 = 1,7984$$

$$0,7984 \times 2 = 1,5968$$

$$0,5968 \times 2 = 1,1936$$

$$0,1936 \times 2 = 0,3872$$

$$0,3872 \times 2 = 0,7744$$

$$0,7744 \times 2 = 1,5488$$

$$0,5488 \times 2 = 1,0976$$

$$0,0976 \times 2 = 0,1952$$

$$0,1952 \times 2 = 0,3904$$

$$0,3904 \times 2 = 0,7808$$

$$0,7808 \times 2 = 1,5616$$

$$\bullet 0,692 = 0,101100010010011$$

Intermediate calculations

$$0,692 \times 2 = 1,384$$

$$0,384 \times 2 = 0,768$$

$$0,768 \times 2 = 1,536$$

$$0,536 \times 2 = 1,072$$

$$0,072 \times 2 = 0,144$$

$$0,144 \times 2 = 0,288$$

$$0,288 \times 2 = 0,576$$

$$0,576 \times 2 = 1,152$$

$$0,152 \times 2 = 0,304$$

$$0,304 \times 2 = 0,608$$

$$0,608 \times 2 = 1,216$$

$$0,216 \times 2 = 0,432$$

$$0,432 \times 2 = 0,864$$

$$0,864 \times 2 = 1,728$$

$$0,728 \times 2 = 1,456$$

Positions	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
$[0,3011]_{dir} =$ $[0,301]_{inv} =$ $[0,301]_{compl}$	0	0	1	0	0	1	1	0	1	0	0	0	1	0	1	0
$[-0,3011]_{dir}$	1	0	1	0	0	1	1	0	1	0	0	0	1	0	1	0
$[-0,3011]_{inv}$	1	1	0	1	1	0	0	1	0	1	1	1	0	1	0	1
$[-0,3011]_{compl}$	1	1	0	1	1	0	0	1	0	1	1	1	0	1	1	0

Positions	S_{15}	14	13	12	11	10	9	8	7	6	5	4	3	2	1
$[0, 5312]_{\text{dir}}$	0	0	1	1	0	1	1	1	0	0	0	0	1	1	0
$[0, 4212]_{\text{inv}}$	1	0	1	1	0	1	1	1	0	0	0	0	1	1	0
$[0, 5312]_{\text{compl}}$	1	1	0	0	1	0	0	0	1	1	1	0	0	1	1
$[-0, 5312]_{\text{dir}}$	1	1	0	0	1	0	0	0	1	1	1	0	0	1	1
$[-0, 4212]_{\text{inv}}$	1	1	0	0	1	0	0	0	1	1	1	0	0	1	1
$[-0, 5312]_{\text{compl}}$	1	1	0	0	1	0	0	0	1	1	1	0	1	0	0

Positions	S_{15}	14	13	12	11	10	9	8	7	6	5	4	3	2	1
$[0, 642]_{\text{dir}}$	0	1	0	1	1	0	0	0	1	0	0	1	0	0	1
$[0, 642]_{\text{inv}}$	1	1	0	1	1	0	0	0	1	0	0	1	0	0	1
$[0, 642]_{\text{compl}}$	1	0	1	0	0	1	1	1	0	1	1	0	1	1	0
$[-0, 642]_{\text{dir}}$	1	0	1	0	0	1	1	1	0	1	1	0	1	1	1
$[-0, 642]_{\text{inv}}$	1	0	1	0	0	1	1	1	0	1	1	0	1	1	0
$[-0, 642]_{\text{compl}}$	1	0	1	0	0	1	1	1	0	1	1	0	1	1	1

Student 2

Subject 3: representations

Option 2: addition and subtraction of subunitary numbers in complementary code.

I received from student 1:

$$[x]_{\text{compl}} = [0,301]_{\text{compl}} = 0^S|010 \ 0110 \ 1000 \ 1010$$

$$[-x]_{\text{compl}} = [-0,301]_{\text{compl}} = 1^S|101 \ 1001 \ 0111 \ 0110$$

$$[y]_{\text{compl}} = [0,4312]_{\text{compl}} = 0^S|011 \ 0111 \ 0000 \ 1100$$

$$[-y]_{\text{compl}} = [-0,4312]_{\text{compl}} = 1^S|100 \ 1000 \ 1111 \ 0010$$

$$[z]_{\text{compl}} = [0,692]_{\text{compl}} = 0^S|101 \ 1000 \ 1001 \ 0011$$

$$[z]_{\text{compl}} = [-0,692]_{\text{compl}} = 1|010 \ 0111 \ 0110 \ 1110$$

$$\begin{array}{r} \text{c: } g \ 1 \ 0 \ 1100 \ 0001 \ 0000 \\ \hline \begin{array}{l} [x+y]_{\text{compl}} = x_{\text{compl}} \oplus y_{\text{compl}} \\ \hline \end{array} \end{array}$$

$$\begin{array}{r} 0|010 \ 0110 \ 1000 \ 1010 \\ 0|011 \ 0111 \ 0000 \ 1100 \\ \hline 0|101 \ 1101 \ 1001 \ 0110 \ 1001 \ 0110 \ \text{correct result} \end{array}$$

$$\begin{array}{r} \text{positive) } \\ [x+y]_{\text{compl}} = 0|101 \ 1101 \ 1001 \ 0110 \\ 0. \underbrace{1011}_{B}, \underbrace{1011}_{B}, \underbrace{0010}_{2}, \underbrace{1100}_{C} = 0, BB2C(16) = \end{array}$$

$$= 0 \cdot 16^0 + B \cdot 16^{-1} + B \cdot 16^{-2} + 2 \cdot 16^{-3} + C \cdot 16^{-4}$$

$$0, BB2C(16) = 11(10) \cdot 16^{-1}(10) + 11(10) \cdot 16^{-2}(10) + 2(10) \cdot 16^{-3}(10) +$$

$$+ 12(10) \cdot 16^{-4}(10) =$$

$$= 11/16 + 11/16^2 + 2/16^3 + 12/16^4 =$$

$$= 0,6875 + 0,0129 + 0,0004 + 0,0001 = \\ = 0,7309$$

$$\{x+y\}_{\text{compl}} > 0 \Rightarrow \{0,7309\}_{\text{compl}}$$

$$\{x-y\}_{\text{compl}} = \{x\}_{\text{compl}} \oplus \begin{array}{r} 0|000 \\ 0|010 \\ -y_{\text{compl}} \\ \hline \sum 0,129_{\text{compl}} \end{array}$$

$$\{x-y\}_{\text{compl}} = 1|110 \quad 1111 \quad 0111 \quad 1100 \quad (\text{negative}) \\ 0.001 \quad 0000 \quad 1000 \quad 0011 +$$

$$\underline{-0,001 \quad 0000 \quad 1000 \quad 0100} = 0,2108(16)$$

$$0(16) = 0(10), 2(16) = 2(10), 1(16) = 1(10), 8(16) = 8(10)$$

$$0,2108(16) = 2 \cdot 16^{-1} + 1 \cdot 16^{-2} + 8 \cdot 16^{-4} = \\ = 2/16 + 1/16^2 + 8/16^4 =$$

$$= 0,125 + 0,0039 + 0,0001 = \\ = 0,129$$

$$\{x-y\}_{\text{compl}} < 0 \Rightarrow \{-0,129\}_{\text{compl}}$$

$$\{z-x\}_{\text{compl}} = \{2\}_{\text{compl}} \oplus \begin{array}{r} 0|15 \quad 011 \quad 0011 \quad 1110 \quad 1100 \\ 0|101 \quad 1000 \quad 1001 \quad 0011 \\ -x_{\text{compl}} \\ \hline \sum 0,3909 \end{array}$$

$$\{z-x\}_{\text{compl}} = 0|011 \quad 0010 \quad 0000 \quad 1001 \quad (\text{positive}) \\ 0.011 \quad 0010 \quad 0000 \quad 1001 = 0,6412(16)$$

$$0(16) = 0(10), 6(16) = 6(10), 4(16) = 4(10), 1(16) = 1(10), \\ 2(16) = 2(10)$$

$$\begin{aligned}
 0,6412(16) &= 6(10) \cdot 16^3(10) + 4(10) \cdot 16^2(10) + 1(10) \\
 &\quad + 2(10) \cdot 16^1(10) = \\
 &= 6/16 + 4/16^2 + 1/16^3 + 2/16^4 = \\
 &= 0,375 + 0,0156 + 0,0002 + 0,0001 = \\
 &= 0,3909
 \end{aligned}$$

$$\{z \mapsto [z]_{\text{compl}} > 0\} = \{0, 3909\}_{\text{compl}}$$

$$\begin{array}{r} \{-z\}_{\text{compl}} = 1000000001100100 \\ \{-2-x\}_{\text{compl}} = \{-2\}_{\text{compl}} + \{x\}_{\text{compl}} \\ \{-2-x\}_{\text{compl}} = 1011001110111011101100 \\ \{-0,9929\}_{\text{compl}} = 1000000001100100 \end{array}$$

$$\begin{array}{r} \{z-x\}_{\text{compl}} = 11000 \quad 0000 \quad 1110 \quad 0100 \\ 0.111 \quad 1111 \quad 0001 \quad 1011 \\ \hline 0.111 \quad 1111 \quad 0001 \quad 1100_1 = 0, \text{ EO38} \\ E \quad 0 \quad 3 \quad 8 \end{array}$$

$$O(16) = \{10, 15(10), 14(10), 3(16)\}$$

$$g(16) = g(10) + 1 \cdot 16^0(10) + 13(10) \cdot 16^1(10) + 3(10) \cdot 16^2(10) +$$

$$0, \text{ED38}(16) = 15(10) \cdot 16^{-1} + \\ + 8(10) \cdot 16^{-2} + 1(10) =$$

$$= 15/16 + 19/16^2 + 3/16^3 + 8/16^4 =$$

$$= 0,9375 + 0,0546 + 0,0007 + 0,0001 =$$

$\geq 0,9929$

$$\{ -2-x \} \text{ compl} < 0 \Rightarrow * \{ -0,9929 \} \text{ compl}$$