

MIE-ARI

(Computer Arithmetic – Homework 2)

Pavel Kubalík
Department of Digital Design
Faculty of Information Technology
Czech Technical University in Prague

<https://courses.fit.cvut.cz/MIE-ARI/>

Task 1 – Negative number representation – all codes

- Fill the following table:

number representation		sign and magnitude	2's complement	1's complement	biased type 0	biased type 1
binary	decimal					
0000	0					
0001	1					
-	-					
0111	7					
1000	8					
1001	9					
-	-					
1111	15					

Task 2 – addition of non-negative numbers I.

Add two numbers using 1's complement code (diminished radix complement).
Write the image of each addend and sum on the left side in the decimal system with a sign.
Analyze when an overflow occurs. For $n=3$. (4bits adder)
Specify an allowable range of numbers for $n=2$.

a)

1001

0111

b)

0110

1000

c)

1001

1100

d)

0110

0011

Advice: Carry out from the higher-order must be added to the lower order (circular carry).

Task 2 – addition of non-negative numbers II.

Add two numbers using biased code type 0.

Write the image of each addend and sum on the left side in the decimal system with a sign.

Analyze when an overflow occurs. For $n=2$. (3bits adder)

Specify an allowable range of numbers for $n=2$.

a)

101

110

b)

101

111

c)

011

010

d)

011

000

Advice: Negate bit of the sum in higher order.

Task 2 – addition of non-negative numbers III.

Add two numbers using biased code type 1.

Write the image of each addend and sum on the left side in the decimal system with a sign.

Analyze when an overflow occurs. For $n=2$. (3bits adder)

Specify an allowable range of numbers for $n=2$.

a)

100

101

b)

100

111

c)

010

001

d)

010

000

Advice: Negate bit of the sum in higher order.