

Theory Questions - Number Systems

1

Tell which of the following numbers in 2's complement on 8 bits, represented in compact hexadecimal form, is closest to zero.

AA, F3, 7F

2

Add the two 8-bit numbers in two's complement (in base 16) A3 and 7F. Show the various steps and any issues.

3

Having 6 bits available, indicate, both in binary and in decimal, the largest and smallest allowable value for representation in 2's complement and in pure binary.

4

The following hexadecimal numbers represent binary numbers encoded in 2's complement on 8 bits. List these numbers in ascending order of value. (It is not necessary to write the corresponding decimal value).

01 A2 B2 32 80 7F FF

5

Indicate the value of the hexadecimal number B5 considering it in:

pure binary

module and sign

two's complement

6

Perform the following operations between binary numbers represented in MS. Also indicate if the operation causes overflow, stating the reason.

010011+011101

011101+110111

7

Given the numbers 24 and 47 (in base 10), convert them to binary and add them. Knowing that the result must be represented on 6 bits, indicate if the operation generates overflow and state the reason.

8

Convert the following decimal number to binary: 177.

Then convert the result to:

octal

hexadecimal

9

Given the following 3 numbers in base 8 and in two's complement, calculate the total sum and always represent it in base 8 on 8 bits:

7, 13, 11

10

Convert to two's complement and module and sign, on 5 bits, the following decimal values

-16

+10

11

Considering operands and result on 8 bits, perform the sum of the following hexadecimal values: B1 and 3F, which represent values in two's complement, and indicate any overflow.

12

What relationship exists between the two values A and B represented in two's complement respectively on 5 and 7 bits: $A > B$, $A < B$, or $A = B$?

$A = 1110011$

$B = 10011$

13

Add the following binary numbers in two's complement expressed on 8 bits, indicating if an overflow is generated:

10001001

11101010

List all the steps for the solution.

16

Given the following two numbers in two's complement on 6 bits, add them indicating if there is an overflow. Also indicate their value in decimal (with sign):

101110 2's complement

011000 2's complement