

1 Digital Systems small exercise 1

Submission date: 16/3/2006.

All questions have an equal weight.

1.1 Question 1

Convert

1. $(1729)_{10} \rightarrow ()_8$
2. $(8EA2)_{16} \rightarrow ()_{10}$
3. $(12.31)_{10} \rightarrow ()_2$
4. $(B.AB)_{13} \rightarrow ()_{10}$

1.2 Question 2

Calculate the 2 complements of:

1. $(28A)_{16}$
2. $(82)_9$

1.3 Question 3

For binary numbers with 4 bits. Determine when there is an overflow and when the calculation can be carrying legally. Use the 2 complement. (The numbers are in base 10).

1. $3+7$
2. $2-3$
3. $4-7$
4. $-1-2$
5. $-5-7$

1.4 Question 4

Calculate (use the 2 complement where necessary). Show the details of your calculation.

1. $(B.AB)_{16} + (A.BF)_{16}$

2. $(28A)_{16} - (82)_{16}$

3. $(28C.43)_{16} - (17.12)_{15}$

1.5 Question 5

The 9 complement is defined as follows:

Let $x = x_1x_2\dots x_m$ be a number in base 10. The 9 complement of the number is $(9 - x_1)(9 - x_2)\dots(9 - x_m)$. That is, the digit in the i -th place is obtained by replacing it with 9-digit. For example the 9-complement of the number 23 is 76.

Set the codes for digits 0..9 with weights 3,3,2,1 and 4,4,3,-2 such that the 9 complement of the digit will be obtained by switching all the 1 with 0 and all the 0 with 1.