Complement arithmetic.

Slide Centre - Digital Electronics

Decimal Representation	Sign-Magnitude Representation	Twos Complement Representation
+8	–	–
+7	0111	0111
+6	0110	0110
+5	0101	0101
+4	0100	0100
+3	0011	0011
+2	0010	0010
+1	0001	0001
+0	0000	0000
–0	1000	–
–1	1001	1111
–2	1010	1110
–3	1011	1101
–4	1100	1100
–5	1101	1011
–6	1110	1010
–7	1111	1001
–8	–	1000

Description: -
-Complement arithmetic.
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Digital computer fundamentals -- Unit 5Complement arithmetic.
Notes: Introduction to the way in which a computer represents and handles negative numbers.
This edition was published in 1979

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Two's Complement

We consider this as a borrow case and borrow 1 from the immediate left bit.

One's Complement

The first thing to think of is the ceiling of all 3-digit numbers i. The last questions introduce student to the idea that numbers in different bases needs to be signalled in some way to prevent confusion. Shapes rather than letters are used here as in another context, bc means b x c, and the confusion between this and the use of symbols to represent a two digit number, where both digits are different, is worth avoiding when students are only starting to learn algebra.

Complement of a Set

It seems therefore, that the only math that microprocessors can do is to add together two numbers of a limited value, and to complement binary numbers. But we can represent it in a positive manner as well as a negative way +0 and -0.

1's Complement Arithmetic

The addition would have been correct if the sign bit had been part of the value, however the calculation was done in twos complement notation and the sign bit is not part of the value. You then invert the digits, and add one to the result. A typical overflow problem that can happen even with single byte numbers is illustrated in Fig.

Complement of a set

This shows a little ambiguity as 0 is now depicted in two ways.

Complement Arithmetic

Lets take a simple example e. There is a lot more to learn. This exercise is a summary of the unit and suggests a project for the student to have an

opportunity to publish learning in a chosen topic.

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