4.2. Subtraction Using Compl (Unsigned)

The method of subtraction using the borrow concept is less efficient when subtraction is implemented by means of digital components. In complement representation, subtraction can be accomplished by the addition of the complement of the subtrahend with the minuend. This procedure has a distinct advantage that the subtraction does not require a separate circuitry; the existing circuitry for addition can be used for subtraction also.

Subtraction in (Base–1)'s Complement

Subtraction in (Base –1)'s complement involves the following steps:

1. Ensure that both the minuend and subtrahend are written with the same number of digits; this can be accomplished by adding 0s at the left of a number, if necessary.
2. Find the (Base –1)'s complement of the number to be subtracted (Subtrahend).
3. Add this to the minuend.
4. If there is a carry of 1 at the most significant digit (this is called end-around carry), add it at the least significant digit, which will give the result. If no carry is generated from the addition of most significant digits, then the result is negative and (Base–1)'s complement of the result is formed.

Subtraction Using Complement method (Unsigned)

① Perform the follo

Signed = +2,-2
Unsigned = 254, 3

① Perform the following subtraction

(a) $(92)_{10} - (56)_{10}$ is 9's complement

solution

92 - minuend
56 - subtrahend

→ minuend and subtrahend are equal digits

→ find the (base-1) complement of subtrahend

= 9's complement of 56

$$= \begin{array}{r} 99 \\ -\ 56 \\ \hline 43 \end{array}$$

Add 1+ ~~the~~ to the minuend

$$= \begin{array}{r} \sout{9?} \\ \sout{0} \\ \sout{5?} \\ \hline \end{array}$$

$$= \begin{array}{r} 92 + \\ 43 \\ \hline 1\,35 \\ \quad 1 \\ \hline 36 \\ \hline \end{array}$$

$(92 - 56) = (36)_{10}$

Problem

① Perform the subtraction $(89)_{10} - (47)_{10}$ using 9's complement

① Perform the subtraction 56 - 92 using 9's complement

solution

→ two digits are equal.

minuend = 56

subtrahend = 92

→ 9's complement of subtrahend =
9 9
9 2
---
0 7

→ Add it to minuend = 56 +
07

63

There is no carry so answer is negative. Take (base-1) complement of 63

9 9
6 3
---
4 6

(56 - 92) = -46

Subtraction in Base's Complement

Subtraction in Base's complement involves the following steps:

1. Ensure that both the minuend and subtrahend are written with the same number of digits; this can be accomplished by adding 0s at the left of a number, if necessary.
2. Find the Base complement of the number to be subtracted (Subtrahend).
3. Add this to the minuend.
4. If there is a carry of 1 at the most significant digit (this is called end-around carry), discard the carry, which will give the result. If no carry is generated from the addition of most significant digits, then the result is negative and Base complement of the result is formed.

Subtraction Using Base's compliment

Example

Perform the subtraction 92 - 56 in 10's compliment

Solution

→ minuend = 92

subtrahend = 56

→ both numbers are equal digits

→ take base compliment of subtrahend

= 10's compliment = 9's compliment + 1

$$\begin{array}{r} 99 \\ -\ 56 \\ \hline 43 \\ +\ 1 \\ \hline 44 \end{array}$$

10's compliment of 56 = 44

→ Add it to the minuend = 92 + 44

$$\begin{array}{r} 92 \\ +\ 44 \\ \hline 1\,36 \end{array}$$

discard carry

result = 36

① Perform the subtraction in 2's comp

(1) 11110 − 1001

Solution

minuend - 11110

Subtrahend - 1001

→ both ~~digits~~ numbers are not equal

so minuend = 11110

subtrahend = 01001

→ take 2's complement of subtrahend

= 10111

→ Add to the minuend = 11110 +
10111
10101

discard

result = 10101