Subtraction by Signed-2's Complement Form

1. Take the 2's complement of the subtrahend (including the sign bit) and add it to the minuend (including sign bit).
2. A carry out of sign-bit position is discarded.

Example 1: (+6) - (+13) = ?

(+6)	⟶	00000110		00000110
- (+13)	⟶	- (00001101)	⟶	+ 11110011
-7				11111001 ⟶

As result is –ve
So, for final answer, take 2's complement of (11111001) accept the sign bit
=10000111= $(-7)_{10}$

Example 1: (-6) - (+13) = ?

(-6)	⟶	11111010		11111010
- (+13)	⟶	- (00001101)	⟶	+ 11110011
-19				11101101 ⟶

As result is –ve
So, for final answer, take 2's complement of (11101101) accept the sign bit
=10010011= $(-19)_{10}$

Example 3: (+6) - (-13) = ?

$$(+6) \longrightarrow 00000110 \qquad 00000110$$

$$- \; (-13) \longrightarrow - (11110011) \longrightarrow + 00001101$$

$$\overline{+19} \qquad \overline{} \qquad \overline{00010011} = (+19)_{10}$$

Example 4: (-6) - (-13) = ?

$$(-6) \longrightarrow 11111010 \qquad 11111010$$

$$- \; (-13) \longrightarrow - (11110011) \longrightarrow + 00001101$$

$$\overline{+7} \qquad \overline{} \qquad \overline{00000111} = (+7)_{10}$$

Question 1

- Add in 8 bits representation.
- A. (+23) + (+19)
- B. (+23) + (-19)
- C. (-23) + (+19)
- D. (-23) + (-19)

Case A : (+23) + (+19) = ?

$$
\begin{array}{rr}
(+23) & (00010111) \\
+\ (+19) & +\ (00010011) \\
\hline
+42 & 00101010
\end{array}
$$

Case B : (+23) + (-19) = ?

$$
\begin{array}{rr}
(+23) & (00010111) \\
+\ (-19) & +\ (11101101) \\
\hline
+4 & 1)00000100
\end{array}
$$

Case C : (-23) + (+19) = ?

       (-23)   (11101001)

    + (+19)   + (00010011)

      -4   11111100   Result is –ve, Complement the result

                     10000011 + 1 = 10000100

Case D : (-23) + (-19) = ?

       (-23)   (11101001)

    +(-19)   + (11101101)

     -42   1)11010110   Result is –ve, Complement the result

                  10101001 + 1 = 10101010

Question 2

- Add in 8 bits representation.
- A. (+23) - (+19)
- B. (+23) - (-19)
- C. (-23) - (+19)
- D. (-23) - (-19)

Case A : (+23) - (+19) = ?

(+23)	(00010111)
- (+19)	+ (11101101)
+4	1)00000100

Case B : (+23) - (-19) = ?

(+23)	(00010111)
- (-19)	+ (00010011)
+42	00101010

Case A : (-23) - (+19) = ?

$$(-23) \qquad (11101001)$$
$$- (+19) \qquad + (11101101)$$
$$-42 \qquad 1)11010110 \qquad \text{Result is –ve, Complement the result}$$
$$10101001 + 1 = 10101010$$

Case B : (-23) - (-19) = ?

$$(-23) \qquad (11101001)$$
$$-(-19) \qquad + (00010011)$$
$$-4 \qquad 11111100 \qquad \text{Result is –ve, Complement the result}$$
$$10000011 + 1 = 10000100$$