2's complement :- To get the 2's complement of a binary number, invert all the bits and then add 1 to the result.

Inverting the bits means changing all 0's to 1s and 1s to 0s. This is called the 1's complement.

Ex Take the 2's complement of 1 0 0 1 0 1 0 0

```
  1 0 0 1 0 1 0 0
  0 1 1 0 1 0 1 1   → 1's complement
              + 1   add
  ---------------
  0 1 1 0 1 1 0 0   → 2's complement
```

Q. Subtract 42 − 22 using 2's complement

46 = 00101110

22 = 00010110

```
      0 0 0 1 0 1 1 0
      1 1 1 0 1 0 0 1   → 1's complement
                  + 1   add
      ---------------
      1 1 1 0 1 0 1 0   → 2's complement
46 → + 0 0 1 0 1 1 1 0
      ---------------
   [1] 0 0 0 1 1 0 0 0
```

[1] → discard; 0 → MSB

MSB = 0 (+ve)

Now Answer is 00011000 Ans.

Q. Substract 26-75 using 2's complement.

26 → 0 0 0 1 1 0 1 0

75 → 0 1 0 0 1 0 1 1.

Now 0 1 0 0 1 0 1 1.

1 0 1 1 0 1 0 0 → 1's complement.

+ 1

1 0 1 1 0 1 0 1. → 2's complement.

26 → + 0 0 0 1 1 0 1 0

1 1 0 0 1 1 1 1

MSB

MSB = 1.

Result is -ve

If we want to take magnitude of this result then we take 2's complement of result.

Result 1 1 0 0 1 1 1 1.

0 0 1 1 0 0 0 0 → 1's complement

+ 1

0 0 1 1 0 0 0 1 Ans.

Q. Substract $(0010110)_2$ from $(1011001)_2$

Substracted number $0\ 0\ 1\ 0\ 1\ 1\ 0$

$1\ 1\ 0\ 1\ 0\ 0\ 1$ — 1's compl.

$+\ 1$

$1\ 1\ 0\ 1\ 0\ 1\ 0$ — 2's compl.

No. add. $+\ 1\ 0\ 1\ 1\ 0\ 0\ 1$

$1\ 1\ 0\ 0\ 0\ 0\ 1\ 1$

discard.

Ans → $1\ 0\ 0\ 0\ 0\ 1\ 1$

Q. Substract 14 from 46 using 2's complement.

$(46)_{10} \longrightarrow (1\ 0\ 1\ 1\ 1\ 0)_2$

$(14)_{10} \longrightarrow (0\ 0\ 1\ 1\ 1\ 0)_2$

$(14) \rightarrow\ 0\ 0\ 1\ 1\ 1\ 0$

$1\ 1\ 0\ 0\ 0\ 1$ — 1's compl.

$+\ 1$

$1\ 1\ 0\ 0\ 1\ 0$

$(46) +\ 1\ 0\ 1\ 1\ 1\ 0$

$1\ 1\ 0\ 0\ 0\ 0$

discard

Ans → $1\ 0\ 0\ 0\ 0\ 0$