Binary Airthmetic

Bits a	b	sum a+b	Carry	Diffrence a-b	borrow	Product a.b
0	0	0	0	0	0	0
0	1	1	0	1	1	0
1	0	1	0	1	0	0
1	1	1	1	0	0	1

Airthmetic Operation

(i) Binary Addition: Two binary no can be added in the same way as two decimal number one from least added. The carry is taken out to high significant bit.

Addition

0 + 0 = 0
0 + 1 = 1
1 + 0 = 1
1 + 1 = 1 0

Example 1 0 1 0 + 1 1 1 1 = 1 1 1 1

(ii) Binary Subtraction: It done as the same way of the decimal number. ~~It started~~ from the LSB and proceed to the MSB.

MSB			LSB	Decimal
1	1	0	1	13
1	0	0	1	9
0	1	0	0	4

Special Case Example

				Decimal
	1	0		
1	0	0	1	9
0	1	1	1	7
0	0	1	0	2

→ In the second column ~~it~~ is ~~not~~ possible to subtract the 1 from 0. So, 1 has to be borrowed from the next MSB. So the borrow taken from the 4 th bit result in 1 and 10 with weight 4 in the 3rd column. So the Subtraction as performed. 10 − 1 = 1

Binary multiplication: The procedure is as same as the decimal multiplication.

→ ~~in the~~ particular case ~~if~~ bit is 1 the multiplicand is copied as such, and multiplier bit is 0, a 0 is placed ~~at~~ the particular position.

→ When all the terms ~~have~~ been performed ~~the~~ all product should be added.

Example:

```
       1011
       1101
       ----
       1011
      0000
     1011
    1011
   --------
   10001111
```

Example 1.01 × 10.1

```
     1.01
     10.1
     ----
      101
     000
    101
   ------
    11.001
```

Binary Division Division follows the same process as done for the decimal number.

Example

(i) 11001 ÷ 101

```
101 ) 11001 ( 101
      101
      -----
      0 101
        101
      -----
      0 000
```

1000100110 ÷ 11001

(ii)

```
11001 ) 1000100110 ( 10110
        011001
        ---------
        00100101
           11001
        ---------
        000011001
            11001
        ----------
        0000000000
```

So the answer is 10110