Complements :

Complements are used in digital computer for simplifying the subtraction operation and for logical manipulation . There are two types of complement for each base (R) system :

1-The R´s complement
2-the (R-1)´s complement

For binary number ⟶ 1´s and 2´s complement
For decimal number ⟶ 9´s and 10´s complement
For octal number ⟶ 7's and 8's complement
For hexadecimal number ⟶ 15's and 16's complement

The 1´s and 2´s complement :

The 1´s complement of a binary number is the no. we get when we change each (0) to (1) and each (1) to (0) (or subtracting each binary no. from 1)

EX: 1´s comp. of 1001 ⟶ 0110
1´s comp. of 110010 ⟶ 001101
2´s comp. = 1´s comp. + 1
2´s comp. of 1011 is 0100 + 1 = 0101
2´s comp. of 1110 is 0001 + 1= 0010

Using 2´s complement in subtraction :

Instead of subtraction a number , we can add it's 2's comp, and disregard the last carry.

EX: decimal

7	111			⟶	111	
-5	-101	1´s	010	2´s	011	
2			1+		1 010	+ ve. No.
			011		X carry	

EX:

13	1101			1101	
-10	1010	1´s	0101	2´s	0110
3			1+	1	0011 +ve. No.
			0110	X carry	

EX:

4	100			100	
-7	-111	1´s	000	2´s	001+
-3			1+	101	
			001	No carry	-ve. No. →

So 101 → 010 → 011