What is number system?

The number systems are used to represent the numbers in a computer memory. the number system can be categorized into 4-types, they are
1. binary number system
2. octal number system
3. decimal number system
4. hexadecimal number system

binary number system:

The binary number system base value 2
it contains 0-1
we can reperesent the binary number systems in python, that number system contains prefix with '0b'

ex: 0b1010

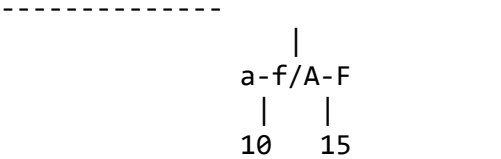
octal number system:
----
the octal number system base value is 8
it contains 0-7
we can represent the octal number systems in python, that number system contains prefix with '0o'

ex:0o37

decimal number system:
----
the decimal number system base value is 10
it contains 0-9
we can represent the decimal number systems in pyhton dont required any special characters.
in python, the decimal number system contains '0' but dont starts with '0'

ex: 39
    309
    039 #invalid

hexadecimal number system :
----
the hexadecimal number system base value is 16
it contains 0-15



we can represent the hexadecimal number systems in python, that number system contains prefix with '0x'

ex:

```
>>> x=0b1010 #binary
>>> x
10
>>> y=0o37 #octal
>>> y
31
>>> z=39 #decimal
>>> z
39
>>> p=0x2c #hexadecimal
>>> p
44
```

we are passing any number system as a input to the python interpreter, by default our python interpreter to return the output as Decimal number system only.

if we want to our required number system as a output in that case we are using number system conversions.

number system conversions:

Number system conversion means to convert one number system into another number system.

1). to convert binary into decimal

```
>>> x = 0b1010 #binary
>>> x
10
```

2). to convert Decimal into Binary

In python, we can convert any number system into binary number system by using bin()

```
>>> y=13 # decimal
>>> bin(y)
0b1101
```

3). to convert octal into Decimal

```
>>> x=0o37 #octal
>>> x
31
```

4). to convert Decimal into Octal

in python, we can convert any number system into octal number system by using oct().

```
>>> y=39 #decimal
>>> oct(y)
0o47
```

5). to convert hexadecimal into Decimal

```
>>> p=0x2c #hexadecimal
>>> p
44
```

6). to convert Decimal into hexadecimal

in python, we can convert any number system into hexadecimal number system by using hex().

```
>>> q=63 #decimal
>>> hex(q)
0x3f
```

7). to convert Binary into Octal

```
>>> x=0b10101 #binary
>>> oct(x)
0o25
```

8). to convert Octal into Binary

```
>>> y=0o37 #octal
>>> bin(y)
0b11111
```

9). to convert Binary into Hexadecimal

```
>>> x=0b110010 #binary
>>> hex(x)
0x32
```

10). to convert Hexadecimal into Binary

```
>>> y=0x2c #hexadecimal
>>> bin(y)
0b101100
```

11). to convert octal into hexadecimal

```
>>> x=0o37 #octal
>>> hex(x)
0x1f
```

12). to convert hexadecimal into octal

```
>>> y=0x2c #hexadecimal
>>> oct(y)
0o54
```