Decimal Number System

Decimal number system is the number system that we use in our day to day life. The decimal number system has its base as 10 i.e any number in the decimal number system is represented using the digits 0-9. Eg. 678.

Binary Number System

Computers understand the language of 0s and 1s that is binary language. The base of the binary number system is 2 i.e only 0 and 1 are used to represent any number in the binary number system. Eg. 10011.

Conversion

We can represent a number in decimal system as

				1	5	2
<= So on	10000 (10^4)	1000 (10^3)	100 (10^2)	10 (10^1)	1 (10^0)

Above, we have tried to represent number 152.
152 can be written as
152 = 1*100 + 5*10 + 2*1
152 = $1*10^2 + 5*10^1 + 2*10^0$

The powers of 10(the number system's base) go on increasing by a factor of 1 as we move towards the most significant decimal digit.

Convert a Number from Binary to Decimal

A similar pattern is observed in the binary number system, suppose we have a number 1101 in the binary number system.

		1	1	0	1
<= So on	16 (2^4)	8 (2^3)	4 (2^2)	2 (2^1)	1 (2^0)

The number that is represented here is

$1*2^3 + 1*2^2 + 0*2^1 + 1*2^0 = 1*8 + 1*4 + 0*2 + 1*1 = 13$

From here we learn that a number 13 in the decimal number system can be represented as 1101 in the binary system.

It is easy to convert a number from binary to decimal. Now let us see how to convert a decimal number to its corresponding binary.

Convert a Number from Decimal to Binary

Steps:
1. Store the remainder when the number is divided by 2 in a list.
2. Divide the number by 2
3. Repeat the above two steps until the number is greater than zero.
4. Reverse the list to get our number in its binary format.

Problems

Convert the given numbers from Binary to Decimal

1. 10001 (Ans = 17)
2. 11000001 (Ans = 193)
3. 111111111 (Ans = 511)

Convert the given numbers from Decimal to Binary

1. 247 (Ans = 11110111)
2. 148 (Ans = 10010100)
3. 18 (Ans = 10010)