**Bit manipulation**

**From where I am going to study and practice bit algorithms,**

* GFG
* Hacker earth
* Interview bit
* Codechef
* Hackerrank

Note : - Here I am not going to write the whole theory and complete explanation. This repository is just for quick revision and to remind me what I have studied till now and provide the link of the original resource from where I have actually studied that topic. Therefore if I want to check the original resource then I can easily check that.

Note:- the order of this file is in that order in which I have studied them.

**From hackerearth:**

1. Basics of bit manipulation

TL : <https://www.hackerearth.com/practice/basic-programming/bit-manipulation/basics-of-bit-manipulation/tutorial/>

* 1. (x-1) will have all the bits same as x, except for the rightmost 1 in x and all the bits to the right of the rightmost 1.
  2. x & (x-1) will have all the bits equal to the x except for the rightmost 1 in x.

x & (x-1) removes the rightmost set bit from x.

* 1. **How to check if a given number is a power of 2 ?**
  2. **Count the number of ones in the binary representation of the given number.**
  3. **Check if the ith bit is set in the binary form of the given number. Or get ith bit**
  4. **How to generate all the possible subsets of a set ?**
  5. **Find the largest power of 2**[**(most significant bit**](https://en.wikipedia.org/wiki/Most_significant_bit)**in binary form), which is less than or equal to the given number N.**
  6. when all the bits of a number N are 1, then N must be equal to the 2i -1 , where i is the number of bits in N.
  7. how can we change all right side bits of most significant bit to 1? N=n|n>>1
  8. x ^ ( x & (x-1)) : Returns the rightmost 1 in binary representation of x.
  9. x & (-x) : Returns the rightmost 1 in binary representation of x
  10. x | (1 << n) : Returns the number x with the nth bit set. Or set nth bit
  11. x=x&~(1<<n) : clear nth bit

1. VL: <https://www.youtube.com/watch?v=wEZfc6cPC4w>

a>>b == a / 2^b

a<<b == a \* 2^b

**From GFG:**

1. find an element that appears once

3 methods to solve this problem…visit

TL : <https://www.geeksforgeeks.org/find-the-element-that-appears-once/>

PL : <https://practice.geeksforgeeks.org/problems/element-appearing-once/0>