BIT MANIPULATION

- $A \wedge 0 = A$
- $A \wedge A = 0$
- $A \wedge B = C$, then $A \wedge C = B$
- $A \wedge B \wedge B = A$
- $A \& B \leq \min(A,B)$
- $A | B \geq \max(A,B)$
- $(A|B) + (A \& B) = A+B$

$$A << B = A \times 2^{B}$$
$$A >> B = A \div 2^{B}$$

- $(A \& 1)$ is 1 if A is odd, else 0
- $A \& (A-1)$ is 0 if A power of 2 (except when A=0)

* Some Tricks.

* If we want to set a bit at nth position in the numbers 'num', it can be done using the 'OR' operator ().

- first we left shift '1' to n position via(1<<n).
- Then use or operator set the bit at that position OR operator will set the bit even if the bit is unset previously in binary representation of number 'num'.

* num |= (1<<pos)

* If we want to unset a bit o nth position in number num then we have to do with the help of AND operator.

* num &= (1<<pos)

- first we left shift '1' to n position via (1<<n)
- The we use AND operator set the bit at that position

* If we want to toggle a bit then we use XOR operator.

* num ^= (1<<pos)

* If we want to Check whether the bit is set or unset then we do AND operation.

bit = num & (1<<pos)