L to R XOR

You are given two numbers ***'L'*** and ***'R'***.

Find the XOR of the elements in the range [L, R].

For Example:

For 'L' = 1 and 'R' = 5.
The answer is 1.

→ Brute force :-

↳ Run a loop from L to R and find the XOR.

```
int findXOR(int L, int R){
    int ans = L;
    for(int i = L + 1; i <= R; i++) {
        ans ^= i;
    }
    return ans;
}
```

→ Optimal Approach :-

Pattern observe

N	XOR	Result	N%4
1		1	1
2	2^1	3	2
3	3^3	0	3
4	4^0	4	4
5	5^4	1	1
6	6^1	7	2
7	7^7	0	3
8	8^0	8	4

```
int XOR(int n)
{
    if(n%4==0)return n;
    if(n%4==1)return 1;
    if(n%4==2)return n+1;
    if(n%4==3)return 0;
}

int findXOR(int L, int R){
    int ans = XOR(R)^XOR(L-1);
    return ans;
}
```