**Find the element that appears once**

Given an array where every element occurs three times, except one element which occurs only once. Find the element that occurs once. The expected time complexity is O(n) and O(1) extra space.

**Examples:**

***Input:****arr[] = {12, 1, 12, 3, 12, 1, 1, 2, 3, 3}****Output:****2   
In the given array all element appear three times except 2 which appears once.*

***Input:****arr[] = {10, 20, 10, 30, 10, 30, 30}****Output:****20   
In the given array all element appear three times except 20 which appears once.*

We can use sorting to do it in O(nLogn) time. We can also use hashing, it has the worst-case time complexity of O(n), but requires extra space.  
The idea is to use bitwise operators for a solution that is O(n) time and uses O(1) extra space. The solution is not easy like other XOR-based solutions, because all elements appear an odd number of times here. The idea is taken from [here](http://www.careercup.com/question?id=7902674).  
Run a loop for all elements in the array. At the end of every iteration, maintain the following two values.  
*ones:*The bits that have appeared 1st time or 4th time or 7th time .. etc.  
*twos:*The bits that have appeared 2nd time or 5th time or 8th time .. etc.  
Finally, we return the value of ‘ones’  
*How to maintain the values of ‘ones’ and ‘twos’?*   
‘ones’ and ‘twos’ are initialized as 0. For every new element in the array, find out the common set bits in the new element and the previous value of ‘ones’. These common set bits are actually the bits that should be added to ‘twos’. So do bitwise XOR of the common set bits with ‘twos’. ‘twos’ also gets some extra bits that appear the third time. These extra bits are removed later.   
Update ‘ones’ by doing XOR of new element with the previous value of ‘ones’. There may be some bits that appear 3rd time. These extra bits are also removed later.  
Both ‘ones’ and ‘twos’ contain those extra bits which appear 3rd time. Remove these extra bits by finding out common set bits in ‘ones’ and ‘twos’.