**Algorithm -Assignment 1**

6. (Pseudocode Required) Bit Complexity and analysis of the above 5 solutions

a. 2N Bit reading Algorithm finding the missing element.

ANS: We can solve this problem by counting the number of 0’s and 1’s ! that we consider every integer in it’s binary form ! We will count the least significant bit of every number ! if the 0’s are more then 1’s then we will remove all the number which end with 0’s in binary ! by this approach we will reduce the complexity by counting N bit’s we will reduce the complexity by half ! then next time we well be N/2 and continue till last bit ! and the toggle of that will be our ans !

**Bounus:**

The only way to solve this problem is by using probability because we cannot have 100per correct answer of the following question .As we know there are majority of trustworthy as compared to liars =trust worthily >liars ratio=51:49

We can find the truth teller in less than <200 questions .as we can make a pair of them and ask them about each other .

* In case 1:if the both are truth teller we will take one of them and other as his representative

|  |  |  |
| --- | --- | --- |
| CASE 1 | | |
| Trust worthy | Trust worthy | 1 |

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* IN CASE 2: if both are liars we will discharge the both of them

|  |  |  |
| --- | --- | --- |
| Case 2 | | |
| liars | liar | 0 |

* In case 3: as in if we get one truth teller and one liar we will also discharge them

|  |  |  |
| --- | --- | --- |
| CASE 3 | | |
| Trust worthy | Liar | 0 |

As we pair the people the people our question will be reduce as we discharge the a pair

We will ask 100 question from from the first pair then it will reduce to 50 question then to 25, 12, 6,3,2,1

As if we get the odd number of people we will take one of them aside and ask everyone about him if the majority says he is a truth teller then we can ask about the rest of them from him

And if the majority says he is a liar we will take a pair again to get a odd number