**Basics of Programming(week-1)**

**Basics of Bit Manipulation**

1. **A XOR challenge**

**#include<bits/stdc++.h>**

**using namespace std;**

**int main()**

**{**

**long long n,m = 0 ;**

**cin >> n;**

**for (int i = 0;i<n;i++)**

**{**

**long long temp = i^n;**

**temp = temp \*i;**

**if(temp > m)**

**{**

**m = temp;**

**}**

**}**

**cout<<m;**

**}**

1. **Equal elements**

**#include <stdio.h>**

**int main(){**

**long int testcase;**

**long int even,value;**

**long int odd;**

**scanf("%ld", &testcase);**

**while(testcase--){**

**even=0;**

**odd=0;**

**long int n;**

**scanf("%ld",&n);**

**for(long int i=0;i<n;i++){**

**scanf("%ld",&value);**

**if(value%2==0){**

**even++;**

**}else{**

**odd++;**

**}**

**}**

**if(even>odd){**

**printf("%ld\n",odd);**

**}else{**

**printf("%ld\n",even);**

**}**

**}**

**}**

1. **A XOR operation**

**#include<bits/stdc++.h>**

**using namespace std;**

**#define FIO ios\_base::sync\_with\_stdio(false);cin.tie(0);cout.tie(0);**

**#define ll long long**

**#define vi vector<ll>**

**#define pb push\_back**

**#define F first**

**#define S second**

**#define all(v) (v).begin(),(v).end()**

**#define pii pair<ll,ll>**

**#define vii vector<pii>**

**#define calc\_fact(n) tgamma(n+1)**

**#define inf LONG\_LONG\_MAX**

**ll solve(ll n,vector<ll>& v)**

**{**

**ll ans = 0;**

**for(ll mask=0;mask<=30;mask++)**

**{**

**ll cnt\_of\_bits=0;**

**for(ll i=0;i<n;i++)**

**{**

**if((1LL<<mask)&v[i])cnt\_of\_bits++;**

**}**

**if(cnt\_of\_bits%2)ans+=(1LL<<mask);**

**}**

**return ans;**

**}**

**int main()**

**{**

**FIO;**

**ll testcase;**

**cin>>testcase;**

**while(testcase--)**

**{**

**// n = no of elements in the array**

**ll n;**

**cin>>n;**

**vector<ll> v(n,0);**

**for(ll i=0;i<n;i++)cin>>v[i];**

**// get minimum k**

**ll k = solve(n,v);**

**// now check if this k is valid or not**

**vector<ll> temp;**

**for(auto it:v)**

**{**

**ll val = it^k;**

**temp.pb(val);**

**}**

**sort(all(temp));**

**sort(all(v));**

**for(ll i=0;i<n;i++)**

**{**

**if(temp[i]!=v[i])**

**{**

**cout<<"-1" << endl;**

**goto x;**

**}**

**}**

**cout<<k<<endl;**

**x: ;**

**}**

**}**

1. **Make the array even**

**#include<bits/stdc++.h>**

**using namespace std;**

**int main()**

**{**

**ios\_base::sync\_with\_stdio(false);**

**cin.tie(0);**

**cout.tie(0);**

**int testcase;**

**cin>>testcase;**

**while(testcase--)**

**{**

**int n;**

**cin>>n;**

**long long arr[n];**

**for(int i=0;i<n;i++)**

**{**

**cin>>arr[i];**

**}**

**int count1=0;**

**int count2=0;**

**int i=0;**

**int flag=0;**

**while(i<n)**

**{**

**flag=0;**

**if(arr[i]%2!=0&&arr[i+1]%2!=0)**

**{**

**count1++;**

**i+=2;**

**flag=1;**

**}**

**else if(arr[i]%2!=0&&arr[i+1]%2==0)**

**{**

**count2+=2;**

**i+=1;**

**flag=1;**

**}**

**if(!flag)**

**{**

**i++;**

**}**

**}**

**cout<<count1+count2<<'\n';**

**}**

**return 0;**

**}**

1. **Special Bit Numbers**

**#include <stdio.h>**

**int main()**

**{**

**int n,q,i,count,l,r,j,x;**

**scanf("%d%d",&n,&q);**

**int arr[n];**

**for(i=1;i<=n;i++)**

**{**

**scanf("%d",&arr[i]);**

**}**

**for(i=0;i<q;i++)**

**{**

**count=0;**

**scanf("%d%d",&l,&r);**

**for(j=l;j<=r;j++)**

**{**

**// printf("start= %d",arr[j]);**

**x=arr[j]&(arr[j]<<1);**

**if(x>0)**

**{**

**count++;**

**}**

**}**

**printf("%d\n",count);**

**}**

**}**

1. **Poisonous gas**

**#include <iostream>**

**using namespace std;**

**int main() {**

**int testcase;**

**cin >> testcase;**

**long long int n;**

**while(testcase--){**

**long long int sum=0;**

**cin >> n;**

**long long int arr[n];**

**for(long long int i=0;i<n;i++){**

**cin >> arr[i];**

**if(arr[i] > 0){**

**sum += arr[i];**

**}**

**}**

**if(sum == 0){**

**cout << "No" << endl;**

**}else if((sum & (sum-1)) == 0){**

**cout << "Yes" << endl;**

**}else{**

**cout << "No"<<endl;**

**}**

**}**

**}**