SEARCHING AND SORTING

Closest Numbers

```
#include<stdio.h>
#include<stdlib.h>

void quickSort(int[], int, int);
int partition(int[], int, int);

int main(){
	int i,n;
	//input
	scanf("%d",&n);
	int *a=(int *)malloc(n*sizeof(int));

	for(i=0;i<n;i++)
		scanf("%d",&a[i]);
	//sorting
	quickSort(a,0,n-1);

	//finding smallest
	int min=a[1]-a[0];
	for(i=2;i<n;i++)
		if(a[i]-a[i-1]<min) min=a[i]-a[i-1];

	//printing all pairs
	for(i=1;i<n;i++)
		if(a[i]-a[i-1]==min) printf("%d %d ",a[i-1],a[i]);
```

```
         printf("\n");
return 0;
}

void quickSort(int a[], int l, int r)
{
  int j;
  if( l < r )
  {
         // divide and conquer
      j = partition( a, l, r);
     quickSort( a, l, j-1);
     quickSort( a, j+1, r);
  }
}

int partition(int a[], int l, int r) {
  int pivot, i, j, t;
  pivot = a[l];
  i = l; j = r+1;
  while( 1)
  {
         do ++i; while( a[i] <= pivot && i <= r );
         do --j; while( a[j] > pivot );
         /*do ++i; while( a[i] >= pivot && i <= r );
         do --j; while( a[j] < pivot );*/
         if( i >= j ) break;
         t = a[i]; a[i] = a[j]; a[j] = t;
  }
  t = a[l]; a[l] = a[j]; a[j] = t;
  return j;
}
```

Ice Cream Parlor

```
#include<stdio.h>
int main()
{
   int t,c,l,i,j,arr[20000];
   scanf("%d",&t);
   for( ; t>0 ; t--)
   {
      scanf("%d%d",&c,&l);
      for(i=0;i<l;i++)
      scanf("%d",&arr[i]);
      for(i=0;i<l-1;i++)
      for(j=i+1;j<l;j++)
      {
         if(arr[i]+arr[j]==c)
         printf("%d %d\n",i+1,j+1);
      }
   }
   return 0;
}
```

Find the Median

RECURSION AND BIT MANIPULATION

Maximizing XOR

```
#include <stdio.h>
#include <string.h>
#include <math.h>
#include <stdlib.h>
#include <assert.h>
int maxXor(int l, int r) {
   int max = 0,i,j;
   for(i=l;i<r;i++)
      for(j=i+1;j<=r;j++)
         max = max<(i^j)?i^j:max;
   return max;
}
int main() {
   int res;
   int _l;
   int _r;
   scanf("%d", &_l);
   scanf("%d", &_r);
   res = maxXor(_l, _r);
   printf("%d", res);
   return 0;
}
```

Sum vs XOR

```
#include <stdio.h>
int main(){
        long long int n,m=1;
        scanf("%lld",&n);
        while(n>0){
                if(n%2==0)m*=2;
                n/=2;
        }
        printf("%lld\n",m);
        return 0; }
```

Flipping Bits

```
#include <stdio.h>
#include <string.h>
#include <math.h>
#include <stdlib.h>
int main() {
  int t;
  unsigned int n;
  scanf("%d", &t);
  while(t-- > 0) {
    scanf("%u", &n);
    printf("%u\n", ~n);
  }
  return 0;
}
```