Q1

```
#include <stdio.h>
int main(){
   int n;
  scanf("%d", &n);
   printf("Enter Sorted Array :");
   int a[n];
   for (int i = 0; i < n; i++) {
      scanf("%d", &a[i]);
   }
   printf("Enter Target sum:");
   int target;
   scanf("%d", &target);

   int l = 0, r = n - 1;

   while (l < r)
   {
      int sum = a[l] + a[r];

      if (sum == target) {
         printf("(%d, %d)", a[l], a[r]);
         return 0;
      }
      else if (sum < target) {
         l++;
      }
      else
      {
         r--;
      }
   }

   printf("-1");
 return 0;
}
```

Q2

```
#include <stdio.h>

int main() {
   int a[] = {1, 3, 8, 12, 4, 2};
   int n = 6;

   int i = 0, j = n - 1;

   while (i < j) {
      int mid = i + (j - i) / 2;

      if (a[mid] < a[mid + 1]) {
         i = mid + 1;
      } else {
         j = mid;
      }
   }

   printf("Peak element: %d", a[i]);
   return 0;
}
```

Q3

```
#include <stdio.h>

int ternarySearch(int arr[], int left, int right, int key)
{
   if (left > right)
      return -1;

   int mid1 = left + (right - left) / 3;
   int mid2 = right - (right - left) / 3;

   if (arr[mid1] == key)
```

```
{
    return mid1;
  }
  if (arr[mid2] == key) {
    return mid2;
  }

  if (key < arr[mid1]){
    return ternarySearch(arr, left, mid1 - 1, key);
  }
  else if (key > arr[mid2]) {
    return ternarySearch(arr, mid2 + 1, right, key);
  }
  else
  {
    return ternarySearch(arr, mid1 + 1, mid2 - 1, key);
  }
};

int main(){
  int n;
  scanf("%d", &n);
  printf("Enter Sorted Array : ");
  int a[n];
  for (int i = 0; i < n; i++) {
    scanf("%d", &a[i]);
  }
  printf("Enter Key:");
  int k;
  scanf("%d", &k);
  printf("Index : %d", ternarySearch(a, 0, n - 1, k));

  return 0;
}
```

Q4

```
#include <stdio.h>

int binarySearch(int arr[], int left, int right, int key) {
  while (left <= right) {
    int mid = left + (right - left) / 2;

    if (arr[mid] == key)
      return mid;
    else if (arr[mid] < key)
      left = mid + 1;
    else
      right = mid - 1;
  }
  return -1;
}

int exponentialSearch(int arr[], int n, int key) {
  if (arr[0] == key)
    return 0;

  int i = 1;
  while (i < n && arr[i] <= key)
    i = i * 2;

  int left = i / 2;
  int right = (i < n) ? i : n - 1;

  return binarySearch(arr, left, right, key);
}

int main()
{
  int n;
  scanf("%d", &n);
  printf("Enter Sorted Array :");
  int a[n];
  for (int i = 0; i < n; i++)
```

```
  {
    scanf("%d", &a[i]);
  }
  printf("Enter Key:");
  int k;
  scanf("%d", &k);

  printf("Position using Binary Search : %d \n",binarySearch(a,0,n-1,k));
  printf("Position using Exponential Search : %d \n",exponentialSearch(a,n,k));

  return 0;
}
```