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# ➢ Laboratory *Assignment #3*

# Write C programs to perform following operations using functions:

## A.Write a function to implement linear search algorithm.

*Ans:*

```
#include<stdio.h>

int linearSearch(int n, int a,int arr[]){
    for(int i =0 ; i <n;i++){
        if(arr[i] == a){
            return i+1;
        }
    }
    return -1;
}
int main(){
int arr[50],n,a,l;
printf("Enter the size of the array: ");
scanf("%d",&n);
printf("Enter the elements of the array\n");
for(int i =0  ; i< n ;i++){
    scanf("%d",&arr[i]);
}
printf("Enter the element to be search: ");
```

```
scanf("%d",&a);
l = linearSearch(n,a,arr);
if(l == -1){
    printf("Element is not found\n");
    }
else{
    printf("Element is found at postion %d\n",l);
}


return 0;
}
```

**OUTPUT =>**

```
Enter the size of the array: 10
Enter the elements of the array
45
12
75
4
6
5
8
9
7
20
```

```
Enter the element to be search: 9
Element is found at postion 8


...Program finished with exit code 0
Press ENTER to exit console.
```

## B.WRITE A NON-RECURSIVE FUNCTION TO IMPLEMENT BINARY SEARCH ALGORITHM.

*Ans:*

```
#include<stdio.h>
int binarySearch(int n, int a,int arr[]){
   int l,h,mid;
   l = 0;
   h = n - l;
   while(l <= h){
      mid = (l+h)/2;
      if(arr[mid] == a){
         return mid +1;
      }
      else if(arr[mid] < a){
         l = mid +1 ;
      }
      else{
         h = mid - 1;
```

```
        }
    }
    return -1;
}
int main(){
int arr[50],n,a,b;
printf("Enter the size of the array: ");
scanf("%d",&n);
printf("Enter the elements of the array\n");
for(int i =0  ; i< n ;i++){
    scanf("%d",&arr[i]);
}
printf("Enter the element to be search: ");
scanf("%d",&a);
b = binarySearch(n,a,arr);
if(b == -1){
    printf("Element is not found\n");
    }
else{
    printf("Element is found at postion %d\n",b);
}
return 0;
}
```

**OUTPUT =>**

```
Enter the size of the array: 12
Enter the elements of the array
45
62
47
85
12
7
8
9
6
4
512
201
Enter the element to be search: 8
Element is found at postion 7


...Program finished with exit code 0
Press ENTER to exit console.
```

# C. Write a recursive function to implement Binary search algorithm.

## Ans:

```
#include <stdio.h>

void binary_search(int [], int, int, int);
void bubble_sort(int [], int);

int main()
{
   int key, size, i;
   int list[25];

   printf("Enter size of a list: ");
   scanf("%d", &size);
   printf("Enter elements\n");
   for(i = 0; i < size; i++)
   {
      scanf("%d",&list[i]);
   }
   bubble_sort(list, size);
   printf("\n");
   printf("Enter key to search\n");
   scanf("%d", &key);
   binary_search(list, 0, size, key);

}
```

```
void bubble_sort(int list[], int size)
{
    int temp, i, j;
    for (i = 0; i < size; i++)
    {
        for (j = i; j < size; j++)
        {
            if (list[i] > list[j])
            {
                temp = list[i];
                list[i] = list[j];
                list[j] = temp;
            }
        }
    }
}

void binary_search(int list[], int lo, int hi, int key)
{
    int mid;

    if (lo > hi)
    {
        printf("Key not found\n");
        return;
    }
```

```
    mid = (lo + hi) / 2;
    if (list[mid] == key)
    {
        printf("Key found\n");
    }
    else if (list[mid] > key)
    {
        binary_search(list, lo, mid - 1, key);
    }
    else if (list[mid] < key)
    {
        binary_search(list, mid + 1, hi, key);
    }
}
```

**OUTPUT =>**

```
Enter size of a list: 11
Enter elements
45
78
96
45
4
2
1
7
```

8

69

34

Enter key to search

4

Key found

...Program finished with exit code 0

Press ENTER to exit console.