BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

FINAL LAB REPORT

DATA STRUCTURE LAB

Submitted to:

Name: Most. Jannatul Ferdous

Department of CSE

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

Intake: 46 Section: 1 (day)

BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

COURSE TITLE: DATA STRUCTURE

COURSE CODE: CSE232

LAB 1

Submitted to:

Name: Most. Jannatul Ferdous

Assistant professor

Department of cse

Bangladesh university of business and technology (BUBT)

Submitted by:

Name: Sadia Tasnim

Id: 20211103012

Intake: 46 Section: 1(day)

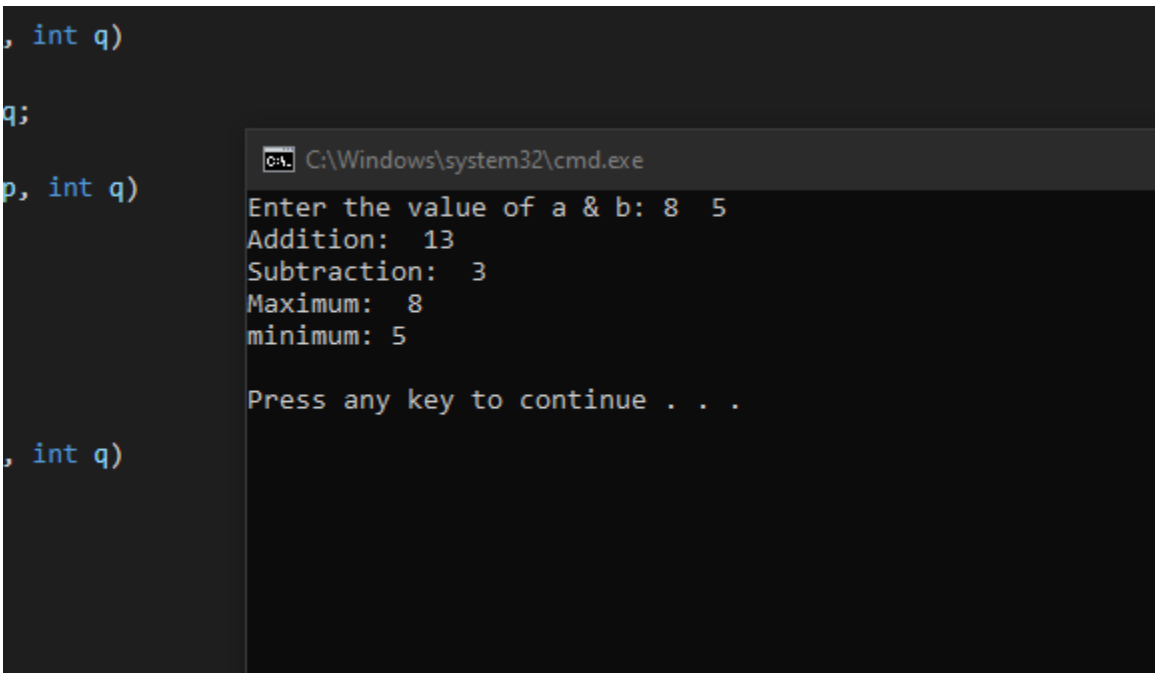
Bangladesh university of business and technology (BUBT)

Solution of Question No 01:

```
#include<stdio.h>
int add(int p, int q)
{
    return p+q;
}
int sub(int p, int q)
{
    return p-q;
}
int max (int p, int q)
{
    if(p>q)
    return p;
    else
    return q;
}
int min(int p, int q)
{
    if(p<q)
    return p;
    else
    return q;
}

int main()
{
    int x,y;
    int sum, sbtruc, maxi, mini;

    printf("Enter the value of a & b: ");
    scanf("%d%d",&x,&y);

    sum= add(x,y);
    printf("Addition:  %d \n",sum);

    sbtruc= sub(x,y);
    printf("Subtraction:  %d \n",sbtruc);

    maxi= max(x,y);
    printf("Maximum:  %d \n",maxi);
    mini= min(x,y);
```

```
    printf("minimum: %d \n", mini);

}
```

Output:

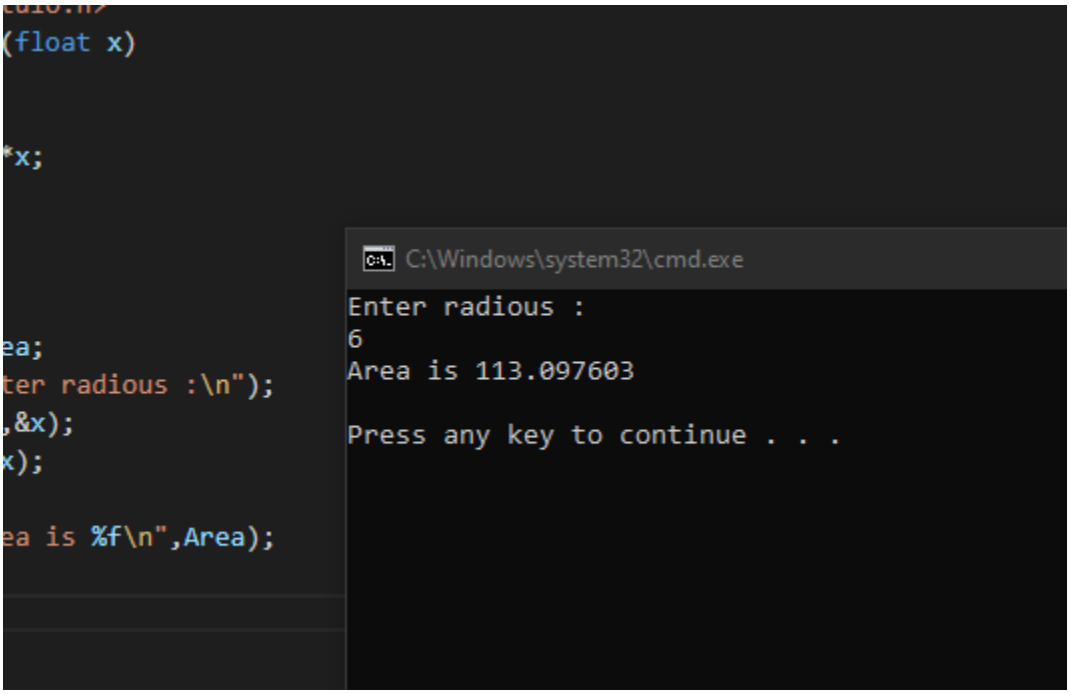


Solution of Question No 02:

```
#include<stdio.h>
float area(float x)
{
float s;
s=3.1416*x*x;
return s;
}
```

```
int main()
{
float x,Area;
printf("Enter radious :\n");
scanf("%f",&x);
Area=area(x);

printf("Area is %f\n",Area);
return 0;
}
```

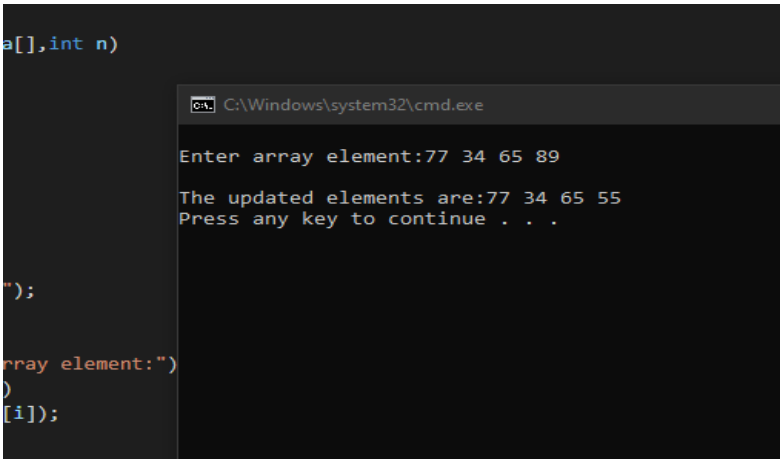
Output:



Solution of Question No 03:

```
#include<stdio.h>

void print_array(int a[],int n)
{
    a[3]=55;
}

int main()
{
    int array[100];
    int n,i;

    printf("Enter n :");
    scanf("%d",&n);

    printf("\nEnter array element:");
    for(i=0; i<n; i++)
    scanf("%d",&array[i]);


    print_array(array,n);

    printf("\nThe updated elements are:");
    for(i=0; i<n; i++)
        printf("%d ",array[i]);



}
```

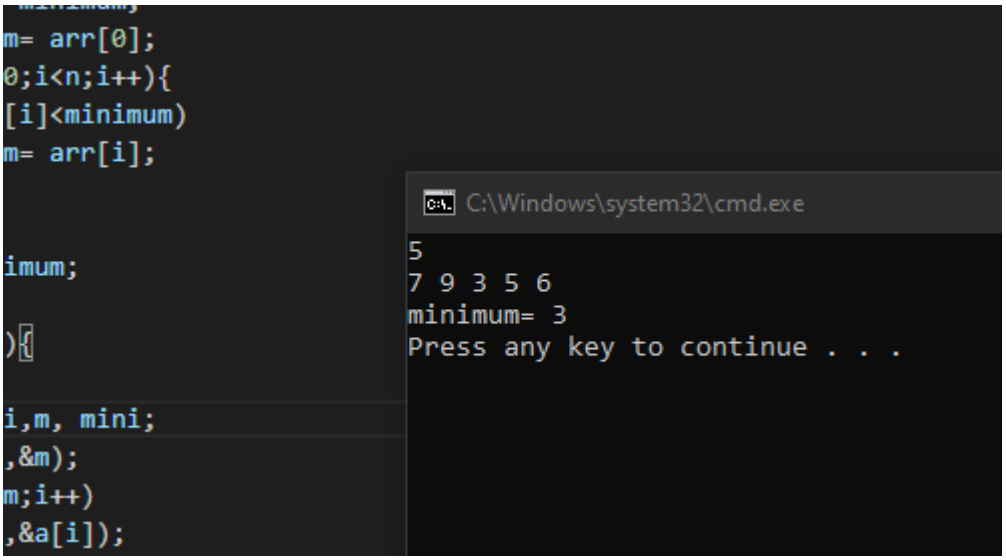
Output:



Answer to the solution no 4:

```
#include<stdio.h>

int minimum (int arr[],int n)
{
    int i, minimum;
    minimum= arr[0];
    for(i=0;i<n;i++){
    if(arr[i]<minimum)
    minimum= arr[i];

}
return minimum;
}
int main (){

int a[10],i,m, mini;
scanf("%d",&m);
for(i=0;i<m;i++)
scanf("%d",&a[i]);
mini=minimum(a,m);
printf("minimum= %d",mini);
}
```

Output:



BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

COURSE TITLE: data structure

COURSE CODE: cse 232

Lab report 2

Submitted to:

Name: Most. Jannatul Ferdous

Assistant professor

Department of cse

Bangladesh university of business and technology (BUBT)

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

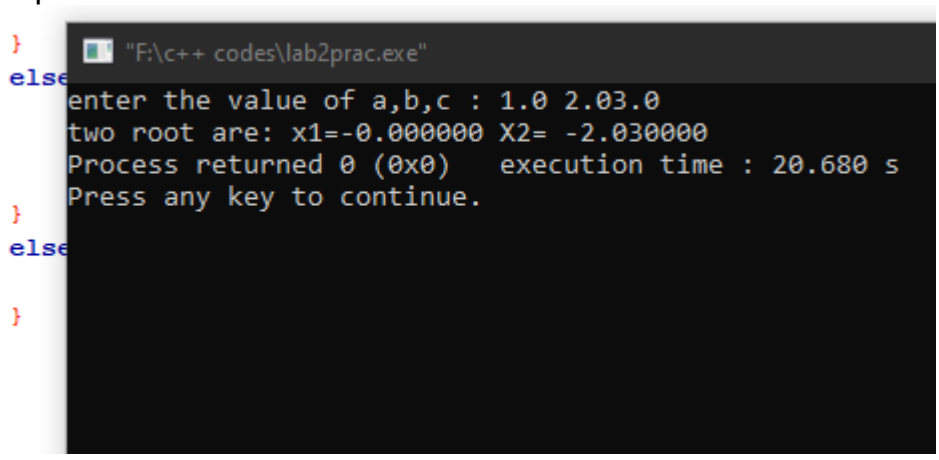
Intake: 46 Section: 1 (day)

Bangladesh university of business and technology (BUB

Answer to the question no 1

```
#include<stdio.h>
#include<math.h>
int main()
{
    float a,b,c,d;
    float x1,x2;
    printf("enter the value of a,b,c : ");
    scanf("%f%f%f",&a,&b,&c);
    d=b*b-4*a*c;
    if(d>0){
            x1=(-b+sqrt(d))/(2*a);
            x2=(-b-sqrt(d))/(2*a);
            printf("two root are: x1=%f X2= %f",x1,x2);

    }
    else if(d==0){
        x1=(float)-b/(2*a);
        printf("unique solution x1=%f",x1);

    }
    else {
        printf("no real solution");
    }
}
```

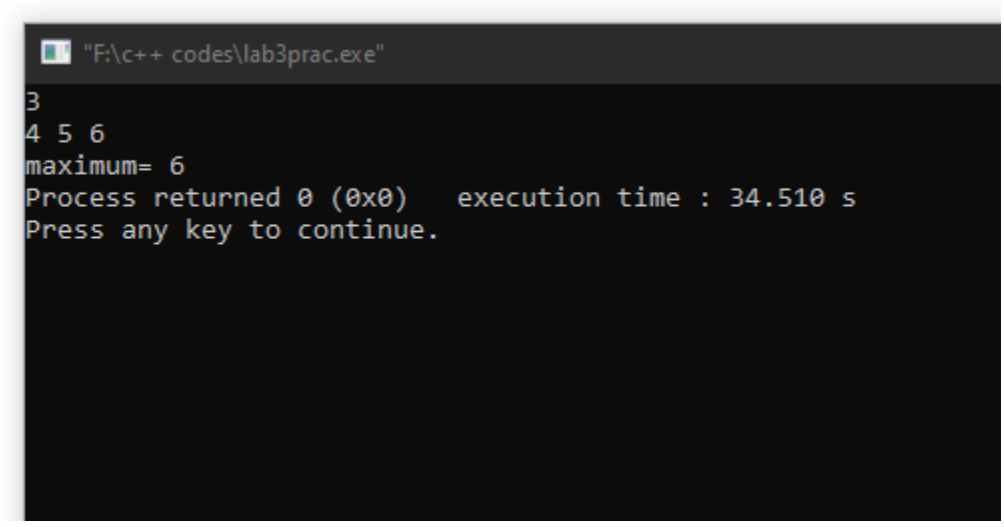
Out put:



Answer to the question no 2

```
#include<stdio.h>

int max_element(int arr[],int n)
{
    int i, max;
    max= arr[0];
    for(i=1;i<n;i++)
    if(arr[i]>max)
    max= arr[i];
return max;


}
int main (){

int arr[20],i,n, maximum;
scanf("%d",&n);
for(i=0;i<n;i++)
scanf("%d",&arr[i]);
maximum=max_element(arr,n);
printf("maximum= %d",maximum);
}
```

Output:

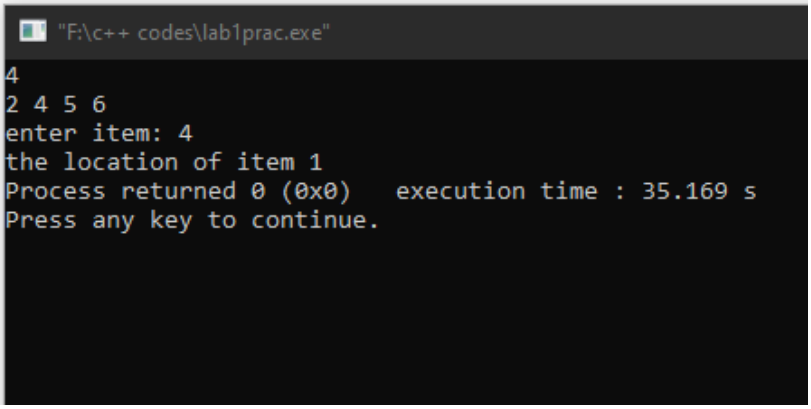


Answer to the question no 3

```
#include<stdio.h>
int search_element(int array[],int n,int m)
{

    int k =1;
    int location=0;
    for(k=1; k<=n; k++){
     if(array[k]==m)
        location=k;
}
return location;
}
int main()
{

    int i,n,loc,item,arr[10];

  scanf("%d",&n);

    for(i=0; i<n; i++){
        scanf("%d",&arr[i]);
    }
      printf("enter item: ");
      scanf("%d",&item);
      loc= search_element(arr,n,item);
    if(loc==0)
       {
        printf("item is not in the array list\n");
    }
    else{printf("the location of item %d ",loc);
    }
return 0;
}
```

Output

:



BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

COURSE TITLE: data structure

COURSE CODE: cse 232

Lab report 3

Submitted to:

Name: Most. Jannatul Ferdous

Assistant professor

Department of cse

Bangladesh university of business and technology (BUBT)

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

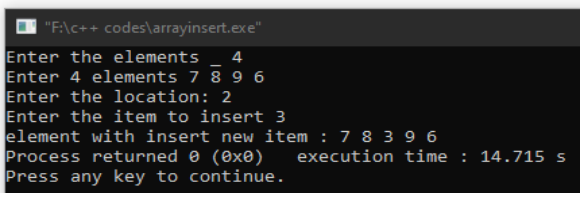
Intake: 46 Section: 1 (day)

Bangladesh university of business and technology (BUB

Answer to the question no 1

```
#include<stdio.h>
insert_array(int lA[50],int n,int k,int item)
 {
    int j=n,i;
    while (j>=k)
    {
        lA[j+1]=lA[j];
        j=j-1;
    }

      lA[k]=item;
      n=n+1;

   printf("element with insert new item : ");

   for (i =0 ; i < n; i++)
      printf("%d",lA[i]);
 }

int main()
{
   int a[100], m, i, n, v;
   printf("Enter the elements _ ");
   scanf("%d", &n);

   printf("Enter %d elements ", n);

   for (i =0; i< n; i++)
      scanf("%d", &a[i]);

   printf("Enter the location: ");
   scanf("%d", &m);

   printf("Enter the item to insert ");
   scanf("%d", &i);
   int x=insert_array(a,n,m,i);
}
```

Output:



Answer to the question no 2

```
#include<stdio.h>
insert_delete(int lA[50],int n,int k)
 {
    int i;
    int item;
    item=lA[k];
    int j=k;
    while (j<=n-1)
    {
        lA[j]=lA[j+1];
        j=j+1;
    }
      n=n-1;

   printf("%d item is deleted \n",item);

   for (i = 0; i <n; i++)
      printf("%d ",lA[i]);
 }

int main()
{
   int a[50],m,i, n;
   printf("Enter elements number : \n");
   scanf("%d", &n);

   printf("Enter %d elements\n", n);

   for (i = 0; i< n; i++)
      scanf("%d", &a[i]);

   printf("Enter the location : \n");
   scanf("%d", &m);

   int x=insert_delete(a,n,m);
}
```

Output:

```
Enter elements number :
4
Enter 4 elements
7 8 9 5
Enter the location :
2
9 item is deleted
7 8 5
Process returned 0 (0x0)   execution time : 17.586 s
Press any key to continue.
```

BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

COURSE TITLE: data structure

COURSE CODE: cse 232

Lab report 4

Submitted to:

Name: Most. Jannatul Ferdous

Assistant professor

Department of cse

Bangladesh university of business and technology (BUBT)

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

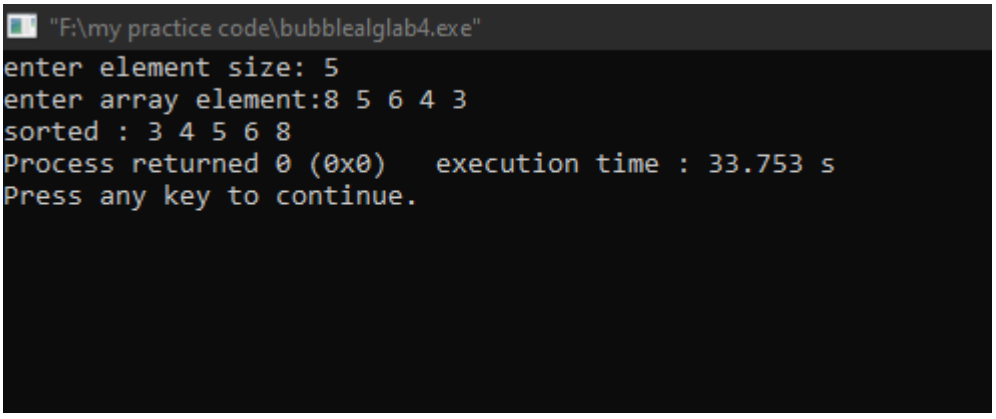
Intake: 46 Section: 1 (day)

Bangladesh university of business and technology (BUB

Answer to the question no 1

```
#include<stdio.h>
void bubble_sort(int data[], int n)
{
    int i, j, temp;
    for(i=0;i<n;i++)
    {
        for(j=0;j<n-i-1;j++)
        {
            if(data[j] > data[j+1])
            {
                temp = data[j];
                data[j]= data[j+1];
                data[j+1]=temp;
            }
        }
    }
}
int main()
{
    int a,b,N,DATA[10];
    printf("enter element size: ");
   scanf("%d", &N);
   printf("enter array element:");
    for(a=0; a<N; a++)
        scanf("%d",&DATA[a]);
    bubble_sort(DATA,N);
    printf("sorted : ");
    for(a=0;a<N;a++)
    printf("%d ",DATA[a]);
}
```

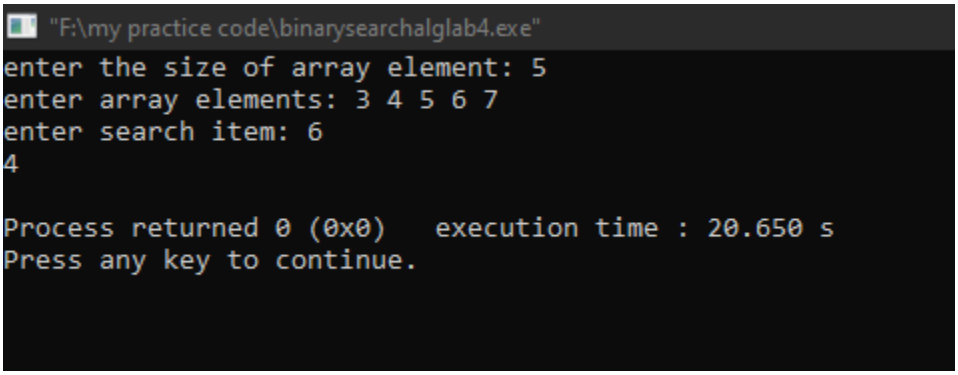
Output:



Answer to the question no 2

```
#include<stdio.h>
int binary_s(int data[],int END, int item)
{
    int BEG=1,mid;
     mid=((BEG+END)/2);
    while(BEG<=END && data[mid]!=item)
    {

       if (item<data[mid])
       {
          END = mid-1;
       }

        else if(item>data[mid])
        {
            BEG=mid+1;

        }
        mid=((BEG+END)/2);

    }
return mid;
}
int main()
{
    int DATA[50],bgn,ed,MID,item,LOC,N,binary;
    printf("enter the size of array element: ");
    scanf("%d",&N);
    printf("enter array elements: ");
    for(int i=1; i<=N; i++)
    scanf("%d",&DATA[i]);
    printf("enter search item: ");
    scanf("%d",&item);
    binary = binary_s(DATA,N,item);
    if(DATA[binary]==item){
        LOC = binary;
        printf("%d\n", LOC);
    }
    else
        printf("Item is not found\n");

}
```

Output:


"F:\my practice code\binarysearchalglab4.exe"
enter the size of array element: 5
enter array elements: 3 4 5 6 7
enter search item: 6
4
Process returned 0 (0x0)   execution time : 20.650 s
Press any key to continue.

BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

COURSE TITLE: data structure

COURSE CODE: cse 232

Lab report 5

Submitted to:

Name: Most. Jannatul Ferdous

Assistant professor

Department of cse

Bangladesh university of business and technology (BUBT)

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

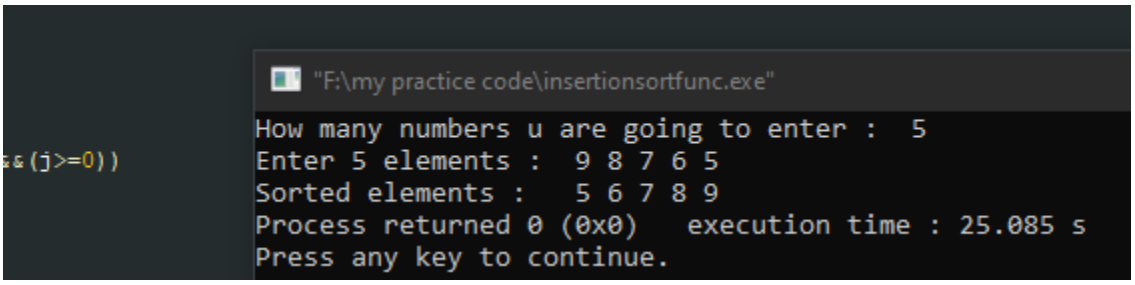
Intake: 46 Section: 1 (day)

Bangladesh university of business and technology (BUB

Answer to the question no 1

```
#include<stdio.h>
void insertionsort(int arr[],int n)
{
    for(int i=1;i<n;i++)
    {
          int temp = arr[i];
          int j = i-1;
          while((temp<arr[j])&&(j>=0))
        {
          arr[j+1]=arr[j];
          j=j-1;
      }
      arr[j+1]=temp;
   }

   printf("Sorted elements :  ");
   for(int i=0;i<n;i++)
      printf(" %d",arr[i]);
}

int main(){

   int i, j, n, temp, arr[25];

   printf("How many numbers u are going to enter :  ");
   scanf("%d",&n);

   printf("Enter %d elements :  ", n);

   for(i=0;i<n;i++)
      scanf("%d",&arr[i]);
  insertionsort(arr,n);

   return 0;
}
```

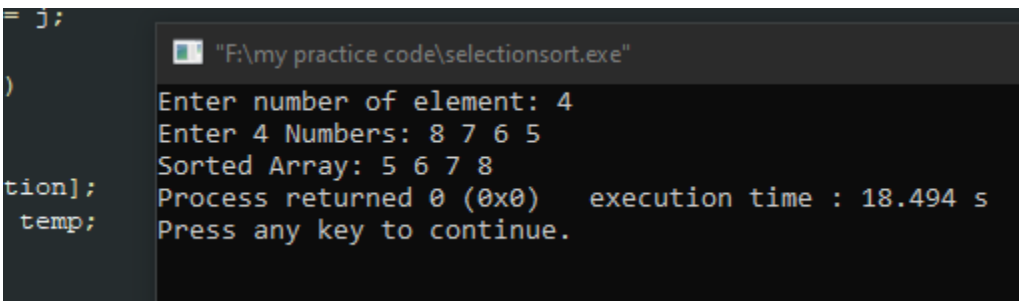
Output:



Answer to the question no 2

```
#include <stdio.h>
void selectionSor(int a[], int n)
{
    int i, j, position, temp;
    for (i = 0; i < n - 1; i++)
    {
        position = i;
        for (j = i + 1; j < n; j++)
        {
            if (a[position] > a[j])
                position = j;
        }
        if (position != i)
        {
            temp = a[i];
            a[i] = a[position];
            a[position] = temp;
        }
    }
    printf("Sorted Array: ");
    for (i = 0; i < n; i++)
        printf("%d ", a[i]);
}
int main()
{
    int a[100], n, i, j, position, temp;
    printf("Enter number of element: ");
    scanf("%d", &n);
    printf("Enter %d Numbers: ", n);
    for (i = 0; i < n; i++)
        scanf("%d", &a[i]);
    selectionSor(a, n);

    return 0;
}
```

Output:



BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

[LAB REPORT 6]

[course code: cse 232]

[Course title: Data structure]

Submitted to:

Most. Jannatul Ferdous

Department of CSE (BUBT)

Submitted by:

Name: Sadia Tasnim

ID: 20211103012

Intake: 46 Sec:1

Answer to the question no 1

```
#include<stdio.h>
int stack[50];
int choice,maxstack,top=0,item,i;
void push(int maxstack)
{

     if(top==maxstack)
    {
        printf("\n\tSTACK is overflow");

    }
    else
    {
        printf(" \nEnter a value you want to push : ");
        scanf("%d",&item);
        top++;
        stack[top]=item;
    }

}
void pop()
{

    if(top<=-1)
    {
        printf("\n\t Stack is under flow");
    }
```

```
    else
    {
        printf("\n\t The popped elements is %d",stack[top]);
        top--;
    }
}

void display()
{

    if(top>=0)
    {
        printf("\n The elements in STACK \n");
        for(i=top; i>=0; i--)
            printf("\n%d",stack[i]);
    }
    else
    {
        printf("\n The STACK is empty");
    }

}
int main()
{

    top=-1;
    printf("\n Enter the size of STACK maximum 50 :  ");
    scanf("%d",&maxstack);
```

```
printf("\n\t STACK IMPLEMENTATION");
printf("\n\t 1.PUSH\n\t 2.POP\n\t 3.DISPLAY\n\t 4.EXIT");
  while(choice!=4)
{
    printf("\n\n Enter the Choice : ");
    scanf("%d",&choice);
    switch(choice)
    {
        case 1:
        {
            push(maxstack);
            break;
        }
        case 2:
        {
            pop();
            break;
        }
        case 3:
        {
            display();
            break;
        }
        case 4:
        {
            printf("\n\t EXITED ");
            break;
        }
```

```
        }


    }
void push();

void pop();

void display();



}
```

Output:

```
 Enter the size of STACK maximum 50 :  2

          STACK IMPLEMENTATION
          1.PUSH
          2.POP
          3.DISPLAY
          4.EXIT

 Enter the Choice : 1

Enter a value you want to push : 10


 Enter the Choice : 1

Enter a value you want to push : 20


 Enter the Choice : 3

 The elements in STACK

20
10

 Enter the Choice : 1

Enter a value you want to push : 30


 Enter the Choice : 1

         STACK is overflow

 Enter the Choice : 2

          The popped elements is 30

 Enter the Choice : 3

 The elements in STACK

20
10

 Enter the Choice : 4

          EXITED
Process returned 0 (0x0)   execution time : 289.555 s
Press any key to continue.
```

BUBT | Bangladesh University of Business and Technology
Committed to Academic Excellence

LAB REPORT 7

DATA STRUCTURE LAB

Submitted by:

Name: Most. Jannatul Ferdous

Department of CSE

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

Intake: 46 Section: 1 (day)

ANSWER TO THE QUESTION NO 1

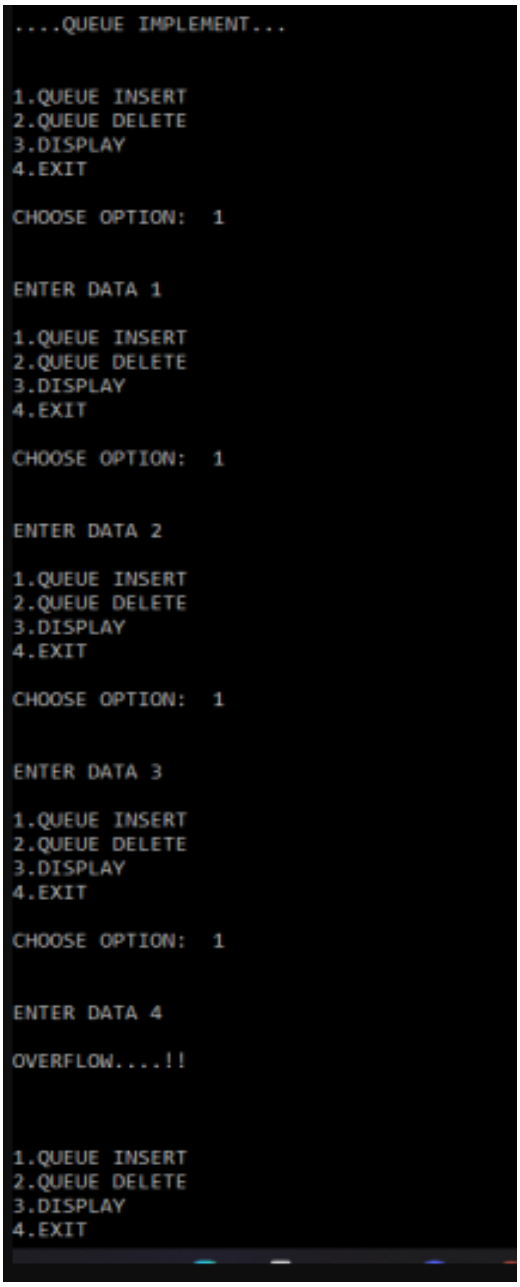
```
#include<bits/stdc++.h>
using namespace std;

int Queues[50],n=3,Front=0,rear=0;

void queueinsert(int item){
   if((Front==1 && rear==n) || Front==rear+1)
      cout<<"\nOVERFLOW....!!\n"<<endl<<endl;
   else if(Front==0){
      Front=1,rear=1;
      Queues[rear]=item;
   }
   else if(rear==n){
      rear=1;
      Queues[rear]=item;
   }
   else{
      rear++;
      Queues[rear]=item;
   }
}
void queuedeleted(){
   int item;
   item = Queues[Front];
   if(Front==0){
      printf("\nUNDERFLOW....!!\n");
```

```
    }
    else if(Front==rear){
        printf("\nDELETED DATA: %d\n", item);
        Queues[Front]=NULL;
        Front=0;
        rear=0;
    }
    else if(Front==n){
        printf("\nDELETED DATA: %d\n", item);
        Queues[Front]=NULL;
        Front=1;
    }
    else{
        printf("\nDELETED DATA: %d\n", item);
        Queues[Front]=NULL;
        Front++;
    }
}

void queuedisplay(){
    int i,sum;

    if(Front>0){
        printf("\n\nALL DATA IN QUEUE: ");
        for(i=1; i<=n; i++){
            cout<<Queues[i]<<" ";
        }
    }
    else
```

```
        cout<<"\nNULL";
    cout<<"\n\n";
}
int main(){
    int C,item,n;
    cout<<"\n....QUEUE IMPLEMENT...\n\n";
    while(C!=4)
        {
       cout<<"\n1.QUEUE INSERT";
        cout<<"\n2.QUEUE DELETE";
        cout<<"\n3.DISPLAY";
        cout<<"\n4.EXIT\n\n";
        cout<<"CHOOSE OPTION:  ";
        cin>>C;
        switch(C){
        case 1:
            printf("\n\nENTER DATA ");
            cin>>item;
            queueinsert(item);
            break;

        case 2:
            queuedeleted();
            break;
        case 3:
            queuedisplay();
            break;
        case 4:
            cout<<"EXIT";
```

```
        break;
      }
    }

}
```

OUTPUT:




3.DISPLAY
4.EXIT
CHOOSE OPTION: 3
ALL DATA IN QUEUE: 1 2 3
1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT
CHOOSE OPTION: 2
DELETED DATA: 1
1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT
CHOOSE OPTION: 2
DELETED DATA: 2
1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT
CHOOSE OPTION: 3
ALL DATA IN QUEUE: 0 0 3
1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT
CHOOSE OPTION: 1
ENTER DATA 4
1.QUEUE INSERT
2.QUEUE DELETE

```
CHOOSE OPTION:  3


ALL DATA IN QUEUE: 0 0 3


1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT

CHOOSE OPTION:  1


ENTER DATA 4

1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT

CHOOSE OPTION:  3


ALL DATA IN QUEUE: 4 0 3


1.QUEUE INSERT
2.QUEUE DELETE
3.DISPLAY
4.EXIT

CHOOSE OPTION:  4
EXIT
Process returned 0 (0x0)   execution time : 162.2
Press any key to continue.
```

BUBT
Bangladesh University of Business and Technology
Committed to Academic Excellence

LAB REPORT 8

DATA STRUCTURE LAB

Submitted by:

Name: Most. Jannatul Ferdous

Department of CSE

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

Intake: 46 Section: 1 (day)

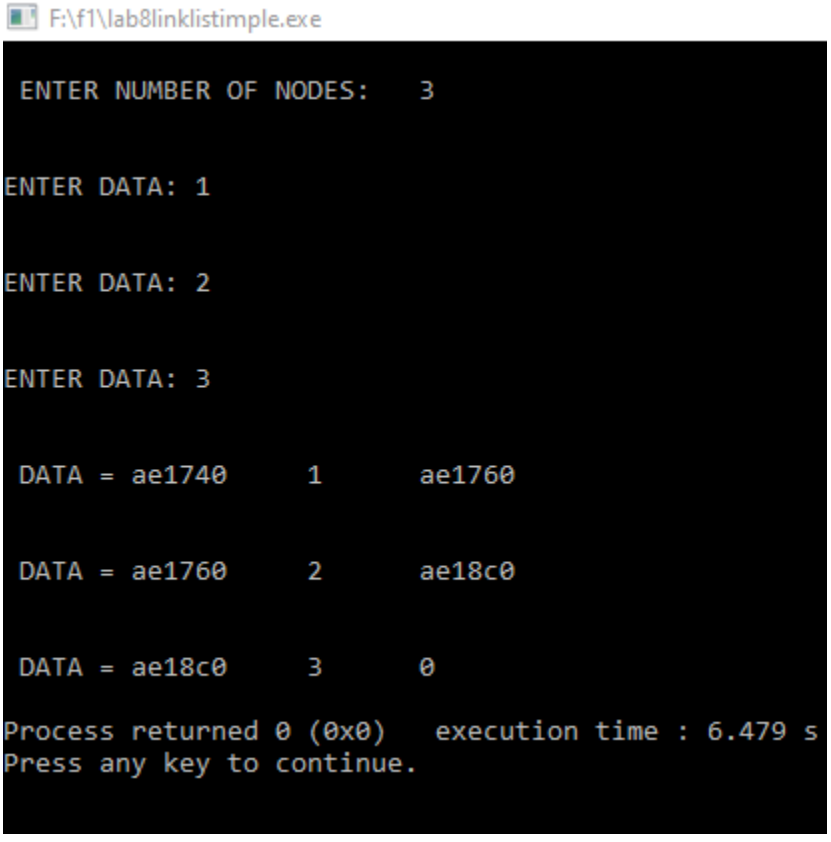
ANSWER TO THE QUESTION NO 1

```
#include<bits/stdc++.h>
#include<stdlib.h>
#include<string.h>
using namespace std;

struct node{
   int num;
   node *next;
}*startnode=NULL;



void createnode(int n)
{
   node *tmp,*newnode;

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

      newnode=(node *)malloc(sizeof(node));
      cout << "\n\nENTER DATA: ";

      cin>>newnode->num;
      newnode->next=NULL;

      if(startnode==NULL){
```

```
            startnode=newnode;
            tmp=startnode;
        }
         else{
        tmp->next=newnode;
        tmp=tmp->next;
    }

    }


}
void display(){

node *tmp;
if(startnode== NULL)
{
    cout<< "\nLIST IS EMPTY..!";
}
else {

    tmp =startnode;
    while(tmp!=NULL)
    {
        printf("\n\n DATA = %x     %d      %x \n",tmp,tmp->num,tmp->next);
        tmp= tmp->next;
    }
}
```

```
}

int main()
{
   int n,x;
   cout<<"\n ENTER NUMBER OF NODES:   ";
   cin>>n;
   createnode(n);
   display();

}
```

Output:



ANSWER TO THE QUESTION NO 2

```
#include<bits/stdc++.h>
#include<stdlib.h>
using namespace std;

struct node{
   int num;
   node *next;
}*startnode=NULL;



void createnode(int n)
{

  node *temp, *newnode;

   for(int i=1; i<=n; i++)
   {
      newnode =(node*)malloc(sizeof(node));
      cout<<"\n\nENTER DATA: ";
      cin>>newnode->num;
      newnode->next=NULL;
      if(startnode==NULL)
      {
        startnode=newnode;
        temp=startnode;
```

```
        }
        else{
           temp->next=newnode;
           temp=temp->next;
        }


    }
}



void insert1ST(int data)
{
    node *temp, *newnode;
    newnode=(struct node*)malloc(sizeof(struct node));
    if (newnode==NULL)
    {
       cout<<" MEMORY CAN'T BE ALLOCATED";
    }
    else
       {
       newnode->num=data;
       newnode->next=NULL;
    }
    if(startnode==NULL)
    {
       startnode=newnode;
       cout<<"\n\nNODE INSERTED SUCCESSFULLY AT 1ST";
```

```
    }
    else
    {
        temp=startnode;
        startnode=newnode;
        newnode->next=temp;
    }
}



void insertlast(int data)
{

    node *newnode, *a=startnode;
    newnode=(struct node*)malloc(sizeof(struct node));
    if(newnode==NULL)
    {

          cout<<" MEMORY CAN'T BE ALLOCATED";
    }
    else{
        newnode->num=data;
        newnode->next=NULL;
    }
    if(startnode==NULL)
    {
        startnode=newnode;
        cout<<"\n\nNODE INSERTED SUCCESSFULLY AT LAST";
```

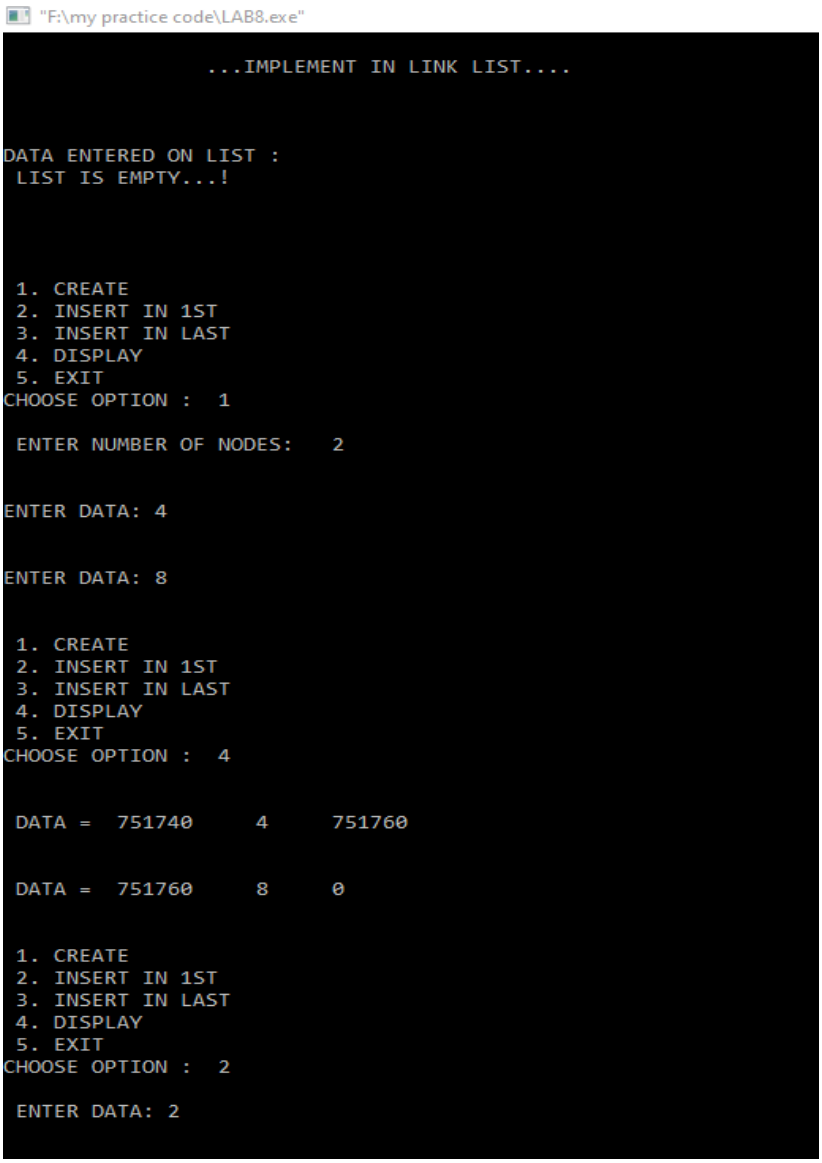
```
    }
    else
    {
        while(a->next!=NULL)
            a=a->next;
        a->next=newnode;
    }
}



void display()
{
    node *tmp;
    if(startnode==NULL)
    {
        cout<<" LIST IS EMPTY...!\n\n\n";

    }
    else{

        tmp = startnode;
        while(tmp != NULL)
        {
            printf("\n\n DATA =  %x     %d     %x \n",tmp,tmp->num,tmp->next);
            tmp = tmp->next;
        }
    }
}
```

```
int main()
{
   int n,x;
   int c,data,position;
   cout<<"\n\t\t...IMPLEMENT IN LINK LIST....\n\n";
   cout<<"\n\nDATA ENTERED ON LIST : \n";
   display();
   while(c!=5)
   {
      cout<<"\n\n 1. CREATE\n";
      cout<<" 2. INSERT IN 1ST\n";
      cout<<" 3. INSERT IN LAST\n";
      cout<<" 4. DISPLAY\n";
      cout<<" 5. EXIT\n";
      cout<<"CHOOSE OPTION :  ";
      cin>>c;
      switch(c)
      {
      case 1:
         {
               cout<<"\n ENTER NUMBER OF NODES:   ";
               cin>>n;
           createnode(n);
         break;
         }
```

```
case 2:
   {
     cout<<"\n ENTER DATA: ";
   cin>>data;
   insert1ST(data);
   break;
   }

   case 3:
   {

     cout<<"\n ENTER DATA: ";
   cin>>data;
   insertlast(data);
   break;
   }


   case 4:
   {
   display();
   break;
   }

   case 5:
   {
    cout<<"EXIT";
   break;
   }
```

```
    }
  }
  return 0;

}
```

OUTPUT:



```
 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. DISPLAY
 5. EXIT
CHOOSE OPTION :  4


 DATA =  7518c0     2     751740


 DATA =  751740     4     751760


 DATA =  751760     8     0


 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. DISPLAY
 5. EXIT
CHOOSE OPTION :  3

 ENTER DATA: 12


 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. DISPLAY
 5. EXIT
CHOOSE OPTION :  4


 DATA =  7518c0     2     751740


 DATA =  751740     4     751760


 DATA =  751760     8     7518e0


 DATA =  7518e0     12     0
```

```
 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. DISPLAY
 5. EXIT
CHOOSE OPTION :  5
EXIT
Process returned 0 (0x0)   execution time : 64.039 s
Press any key to continue.
```

BUBT
Bangladesh University of Business and Technology
Committed to Academic Excellence

LAB REPORT 8

DATA STRUCTURE LAB

Submitted by:

Name: Most. Jannatul Ferdous

Department of CSE

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

Intake: 46 Section: 1 (day)

ANSWER TO THE QUESTION NO 1

```
#include<bits/stdc++.h>
#include<stdlib.h>
using namespace std;

struct node{
   int num;
   node *next;
}*startnode=NULL;



void createnode(int n)
{

  node *temp, *newnode;

   for(int i=1; i<=n; i++)
   {
      newnode =(node*)malloc(sizeof(node));
      cout<<"\n\nENTER DATA: ";
      cin>>newnode->num;
      newnode->next=NULL;
      if(startnode==NULL)
      {
        startnode=newnode;
        temp=startnode;
```

```
        }
        else{
           temp->next=newnode;
           temp=temp->next;
        }


    }
   }

void insert1ST(int data)
{
    node *temp, *newnode;
    newnode=(struct node*)malloc(sizeof(struct node));
    if (newnode==NULL)
    {
       cout<<" MEMORY CAN'T BE ALLOCATED";
    }
    else
       {
       newnode->num=data;
       newnode->next=NULL;
    }
    if(startnode==NULL)
    {
       startnode=newnode;
       cout<<"\n\nNODE INSERTED SUCCESSFULLY AT 1ST";
    }
    else
```

```
    {
       temp=startnode;
       startnode=newnode;
       newnode->next=temp;
    }
}



void insertlast(int data)
{

    node *newnode, *a=startnode;
    newnode=(struct node*)malloc(sizeof(struct node));
    if(newnode==NULL)
    {

          cout<<" MEMORY CAN'T BE ALLOCATED";
    }
    else{
       newnode->num=data;
       newnode->next=NULL;
    }
    if(startnode==NULL)
    {
       startnode=newnode;
       cout<<"\n\nNODE INSERTED SUCCESSFULLY AT LAST";
    }
    else
```

```
    {
        while(a->next!=NULL)
            a=a->next;
        a->next=newnode;
    }
}



void insertmid(int position,int data)
{
    node *newnode,*a=startnode;
    newnode= (struct node*)malloc(sizeof(struct node));
if(newnode==NULL)
    {

            cout<<" MEMORY CAN'T BE ALLOCATED";
    }
    else{
        newnode->num=data;
        newnode->next=NULL;
    }
    for(int i=2; i<position; i++)
    {
        a=a->next;
        if(a==NULL)
            cout<<"LESS THAN"<<position<< "NODES IN THE LIST...!!!";
    }
    newnode->next=a->next;
```

```
    a->next=newnode;
    cout<<"\n\nNODE INSERTED SUCCESSFULLY";

}


void display()
{
    node *tmp;
    if(startnode==NULL)
    {
        cout<<" LIST IS EMPTY...!\n\n\n";

    }
    else{

        tmp = startnode;
        while(tmp != NULL)
        {
            printf("\n\n DATA =  %x     %d     %x \n",tmp,tmp->num,tmp->next);
            tmp = tmp->next;
        }
    }
}

void searchh(int x)
{
    node *temp=startnode;
    while(temp!=NULL)
```

```
    {
        if(temp->num==x)
        {
            cout<<"FOUND "<<temp->num;
        }
        temp=temp->next;
    }




}

int main()
{
    int n,x;
    int c,data,position;
    cout<<"\n\nDATA ENTERED ON LIST : \n";
    display();
    while(c!=7)
    {
        cout<<"\n\n 1. CREATE\n";
        cout<<" 2. INSERT IN 1ST\n";
        cout<<" 3. INSERT IN LAST\n";
        cout<<" 4. INSERT IN MIDDLE\n";
        cout<<" 5. DISPLAY\n";
        cout<<" 6. SEARCH\n";
        cout<<" 7. EXIT\n";
        cout<<"CHOOSE OPTION :  ";
```

```
cin>>c;
switch(c)
{
case 1:
   {
        cout<<"\n ENTER NUMBER OF NODES:   ";
        cin>>n;
     createnode(n);
   break;
   }

case 2:
   {
     cout<<"\n ENTER DATA: ";
   cin>>data;
   insert1ST(data);
   break;
   }

   case 3:
   {

     cout<<"\n ENTER DATA: ";
   cin>>data;
   insertlast(data);
   break;
   }

   case 4:
```

```
        {
          cout<<"\n ENTER DATA:  ";
        cin>>data;
        cout<<"\n ENTER POSITION:  ";
        cin>>position;
        insertmid(position,data);
        break;
        }


        case 5:
        {
        display();
        break;
        }
        case 6:
           cout<<"\nENTER DATA : ";
           cin>>x;
           searchh(x);
           break;
        case 7:
        {
         cout<<"EXIT";
        break;
        }

    }
}
return 0; }
```

Output:

```
DATA ENTERED ON LIST :
 LIST IS EMPTY...!



 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. INSERT IN MIDDLE
 5. DISPLAY
 6. SEARCH
 7. EXIT
CHOOSE OPTION :  1

 ENTER NUMBER OF NODES:   3


ENTER DATA: 1


ENTER DATA: 3


ENTER DATA: 4


 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. INSERT IN MIDDLE
 5. DISPLAY
 6. SEARCH
 7. EXIT
CHOOSE OPTION :  5


 DATA =  d91740     1     d91760


 DATA =  d91760     3     d918c0


 DATA =  d918c0     4     0
```

```
 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. INSERT IN MIDDLE
 5. DISPLAY
 6. SEARCH
 7. EXIT
CHOOSE OPTION :  4

 ENTER DATA:  2

 ENTER POSITION:  2


NODE INSERTED SUCCESSFULLY

 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. INSERT IN MIDDLE
 5. DISPLAY
 6. SEARCH
 7. EXIT
CHOOSE OPTION :  5


 DATA =  d91740     1     d918e0


 DATA =  d918e0     2     d91760


 DATA =  d91760     3     d918c0


 DATA =  d918c0     4     0


 1. CREATE
 2. INSERT IN 1ST
 3. INSERT IN LAST
 4. INSERT IN MIDDLE
 5. DISPLAY
 6. SEARCH
 7. EXIT
CHOOSE OPTION :  7
EXIT
Process returned 0 (0x0)   execution time : 105.851 s
Press any key to continue.
```

ANSWER TO THE QUESTION NO 2

```
#include<bits/stdc++.h>
#include<stdlib.h>
using namespace std;

struct node{
   int num;
   node *next;
}*startnode=NULL;



void createnode(int n)
{

  node *temp, *newnode;

   for(int i=1; i<=n; i++)
   {
      newnode =(node*)malloc(sizeof(node));
      cout<<"\n\nENTER DATA: ";
      cin>>newnode->num;
      newnode->next=NULL;
      if(startnode==NULL)
      {
        startnode=newnode;
        temp=startnode;
      }
```

```
        else{
           temp->next=newnode;
           temp=temp->next;
        }


    }
   }



void delete1ST(int data)
{
 node *newnode;
    if(startnode==NULL)
    {
       cout<<"\n\nERROR.....LIST IS EMPTY....!!!";
    }
    else
    {
       node* temp=startnode;
       startnode=temp->next;
       delete temp;
       cout<<"\n\nFIRST NODE DELETED SUCCESSFULLY...!!";
    }
}
```

```
void deletelast(int data)
{
    node *newnode;
   if(startnode==NULL)
   {
       cout<<"\n\nERROR.....LIST IS EMPTY....!!!";
   }
   else
   {
      node *q=startnode;
      while(q->next->next!=NULL)
         q=q->next;
      node* temp=q->next;
      q->next=NULL;
      delete temp;
      cout<<"\n\nLAST NODE DELETED SUCCESSFULLY...!!";
   }
}



void deletemid(int position,int data)
{
   node *newnode,*a=startnode;
   for(int i=2; i<position; i++)
   {
      a=a->next;
      if(a==NULL)
         cout<<"\nNOODE NOT FOUND\n";
```

```
    }
    if(int i=position)
    newnode=a->next;
    a->next=newnode->next;
    delete newnode;
    cout<<"\n\nNODE DELETED SUCCESSFULLY";

}



void display()
{
    node *tmp;
    if(startnode==NULL)
    {
        cout<<" LIST IS EMPTY...!\n\n\n";

    }
    else{

        tmp = startnode;
        while(tmp != NULL)
        {
            printf("\n\n DATA =  %x     %d     %x \n",tmp,tmp->num,tmp->next);
            tmp = tmp->next;
        }
    }
}
```

```
int main()
{
   int n,x;
   int c,data,position;
   cout<<"\n\nDATA ENTERED ON LIST : \n";
   display();
   while(c!=6)
   {
      cout<<"\n\n 1. CREATE NODE\n";
      cout<<" 2. DELETE 1ST NODE\n";
      cout<<" 3. DELETE LAST NODE\n";
      cout<<" 4. DELETE MIDDLE NODE\n";
      cout<<" 5. DISPLAY\n";
      cout<<" 6.EXIT\n";
      cout<<"CHOOSE OPTION :  ";
      cin>>c;
      switch(c)
      {
          case 1:
         {
               cout<<"\n ENTER NUMBER OF NODES:   ";
               cin>>n;
           createnode(n);
         break;
         }
```

```
case 2:
   {
   delete1ST(data);
   break;
   }

   case 3:
   {
   deletelast(data);
   break;
   }

   case 4:
   {
   cout<<"\n ENTER POSITION:  ";
   cin>>position;
   deletemid(position,data);
   break;
   }


   case 5:
   {
   display();
   break;
   }
   case 6:
   {
    cout<<"EXIT";
```

```
            break;
            }


        }
    }
    return 0;

}
```

OUTPUT:

F:\f1\lab9linklistdelete.exe

```
DATA ENTERED ON LIST :
 LIST IS EMPTY...!



 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  1

 ENTER NUMBER OF NODES:   4


ENTER DATA: 1


ENTER DATA: 2


ENTER DATA: 3


ENTER DATA: 4


 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  2


FIRST NODE DELETED SUCCESSFULLY...!!

 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  5
```

```
 DATA =  1e1760     2     1e18c0


 DATA =  1e18c0     3     1e18e0


 DATA =  1e18e0     4     0


 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  3


LAST NODE DELETED SUCCESSFULLY...!!

 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  5


 DATA =  1e1760     2     1e18c0


 DATA =  1e18c0     3     0


 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  4

 ENTER POSITION:  2


NODE DELETED SUCCESSFULLY
```

```
 ENTER POSITION:  2


NODE DELETED SUCCESSFULLY

 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  5


 DATA =  1e1760     2     0


 1. CREATE NODE
 2. DELETE 1ST NODE
 3. DELETE LAST NODE
 4. DELETE MIDDLE NODE
 5. DISPLAY
 6.EXIT
CHOOSE OPTION :  6
EXIT
Process returned 0 (0x0)   execution time : 59.170 s
Press any key to continue.
```

BUBT | Bangladesh University of Business and Technology

Committed to Academic Excellence

LAB REPORT 10

DATA STRUCTURE LAB

Submitted to:

Name: Most. Jannatul Ferdous

Department of CSE

Submitted by:

Name: Sadia Tasnim

Id : 20211103012

Intake: 46 Section: 1 (day)

Answer to the problem solution 1

```
#include<bits/stdc++.h>
#include<stdlib.h>
using namespace std;

struct node{
   int num;
   node *next;
}*startnode=NULL;



void createnode(int n)
{

  node *temp, *newnode;

   for(int i=1; i<=n; i++)
   {
      newnode =(node*)malloc(sizeof(node));
      cout<<"\n\nENTER DATA: ";
      cin>>newnode->num;
      newnode->next=NULL;
      if(startnode==NULL)
      {
        startnode=newnode;
        temp=startnode;
```

```
        }
        else{
           temp->next=newnode;
           temp=temp->next;
        }


    }
   }

  void searchh(int x)
{
    node *temp=startnode;
    while(temp!=NULL)
    {
       if(temp->num==x)
       {
          cout<<"\n\n\n>>>--DATA FOUND :  "<<temp->num;
          break;
       }
       else
       {
          temp=temp->next;
           cout<<"\n\n\n.....NOT FOUND.....\n";
           break;
       }

    }
```

```
}

void display()
{
   node *tmp;
   if(startnode==NULL)
   {
      cout<<" LIST IS EMPTY...!\n\n\n";

   }
   else{

      tmp = startnode;
      while(tmp != NULL)
      {
         printf("\n\n DATA =  %x     %d     %x \n",tmp,tmp->num,tmp->next);
         tmp = tmp->next;
      }
   }
}

int main()
{
   int n,x;
   int c,data,position;
```

```
cout<<"\n\nDATA ENTERED ON LIST : \n";
while(c!=4)
{
   cout<<"\n\n 1. CREATE\n";
   cout<<" 2. DISPLAY\n";
   cout<<" 3. SEARCH\n";
   cout<<" 4. EXIT\n";
   cout<<"CHOOSE OPTION :  ";
   cin>>c;
   switch(c)
   {
   case 1:
      {
            cout<<"\n ENTER NUMBER OF NODES:   ";
            cin>>n;
        createnode(n);
      break;
      }

      case 2:
      {
      display();
      break;
      }
      case 3:
         cout<<"\nENTER DATA : ";
         cin>>x;
         searchh(x);
         break;
```

```
        case 4:
        {
          cout<<"EXIT";
        break;
        }

      }
    }
    return 0;

}
```

Output:

```
DATA ENTERED ON LIST :


 1. CREATE
 2. DISPLAY
 3. SEARCH
 4. EXIT
CHOOSE OPTION :  1

 ENTER NUMBER OF NODES:   2


ENTER DATA: 5


ENTER DATA: 10


 1. CREATE
 2. DISPLAY
 3. SEARCH
 4. EXIT
CHOOSE OPTION :  2


 DATA =  9d1750     5     9d1770


 DATA =  9d1770     10     0


 1. CREATE
 2. DISPLAY
 3. SEARCH
 4. EXIT
CHOOSE OPTION :  3

ENTER DATA : 2



.........NOT FOUND.........
```

```
.........NOT FOUND.........


 1. CREATE
 2. DISPLAY
 3. SEARCH
 4. EXIT
CHOOSE OPTION :  3

ENTER DATA : 5



>>>--DATA FOUND :  5

 1. CREATE
 2. DISPLAY
 3. SEARCH
 4. EXIT
CHOOSE OPTION :  4
EXIT
Process returned 0 (0x0)   execution time : 43.835 s
Press any key to continue.
```

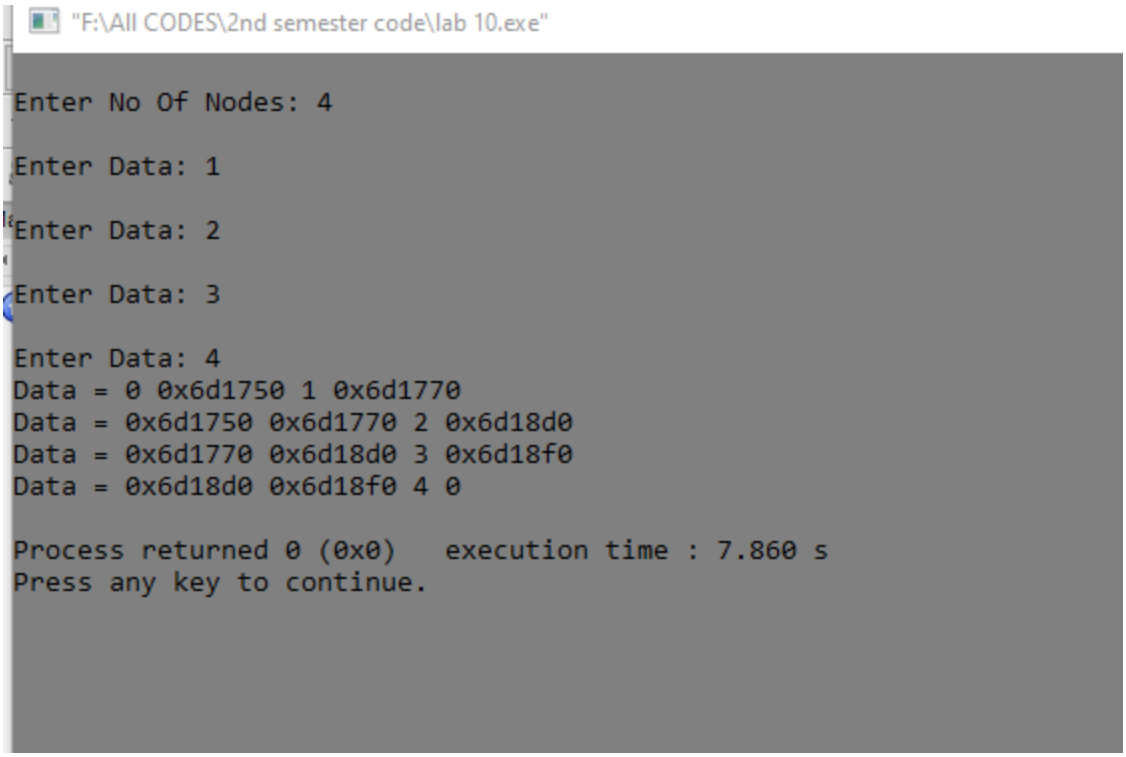
Answer to the problem solution 2

```
#include <iostream>

#include <bits/stdc++.h>

using namespace std;

struct node

{

   int num;

   node *next, *prev;


} *stnode = NULL, *ennode = NULL;
```

```
void createnode(int n);
void display();

int main()
{
   int n;
   cout << "\nEnter No Of Nodes: ";
   cin >> n;
   createnode(n);
   display();
}
void createnode(int n)
{
   node *tmp, *newn;
   for (int i = 0; i < n; i++)
   {
      newn = (node *)malloc(sizeof(node));
      cout << "\nEnter Data: ";
      cin >> newn->num;
      newn->num;
      newn->next = NULL;
      newn->prev = ennode;
      if (stnode == NULL)
      {
         stnode = newn;
         ennode = stnode;
      }
      else
      {
```

```
            ennode->next = newn;
            ennode = ennode->next;
        }
    }
}
void display()
{
    node *tmp;
    if (stnode == NULL)
    {
        cout << "List Is Empty" << endl;
    }
    else
    {
        tmp = stnode;
        while (tmp != NULL)
        {
            cout << "Data = " << tmp->prev << " " << tmp << " " << tmp->num << " " << tmp->next << endl;
            tmp = tmp->next;
        }
    }
}
```

Output:


"F:\All CODES\2nd semester code\lab 10.exe"
Enter No Of Nodes: 4
Enter Data: 1
Enter Data: 2
Enter Data: 3
Enter Data: 4
Data = 0 0x6d1750 1 0x6d1770
Data = 0x6d1750 0x6d1770 2 0x6d18d0
Data = 0x6d1770 0x6d18d0 3 0x6d18f0
Data = 0x6d18d0 0x6d18f0 4 0
Process returned 0 (0x0) execution time : 7.860 s
Press any key to continue.