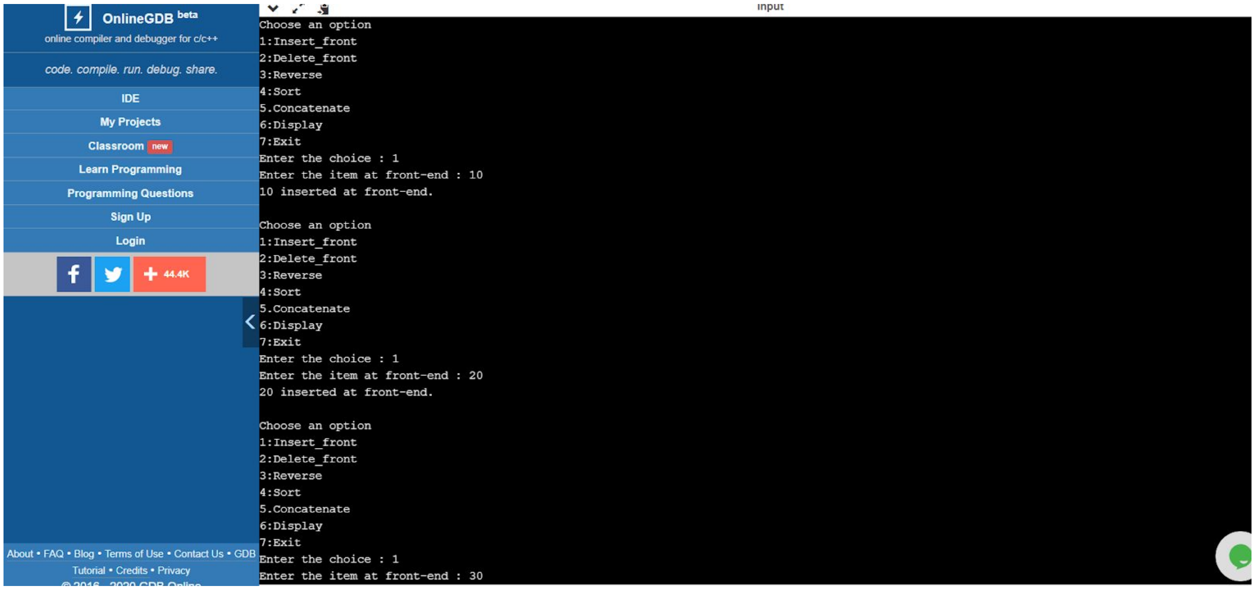
LAB 7-OPERATIONS ON SINGLY LINKED LIST

```
#include<stdio.h>
#include<conio.h>
#include<process.h>

struct node
{
 int info;
 struct node *link;
};
typedef struct node *NODE;

NODE getnode()
{
   NODE x;
   x = (NODE)malloc(sizeof(struct node));
   if(x==NULL)
   {
      printf("\nMemory is full\n");
      exit(0);
   }
   return x;
}

NODE insert_front(NODE first,int item)
{
   NODE temp;
   temp=getnode();
   temp->info=item;
   temp->link=NULL;
   if(first==NULL)
   {
        return temp;
    }
    temp->link=first;
    first=temp;
    return first;
}

NODE delete_front(NODE first)
{
    NODE temp;
    if(first==NULL)
    {
        printf("List is empty. Cannot delete\n");
        return first;
    }
    temp=first;
    temp = temp->link;
    printf("Item deleted at front end is %d\n",first->info);
    free(first);
    return temp;
}

NODE IF(NODE second,int item)
{
    NODE temp;
    temp=getnode();
    temp->info=item;
    temp->link=NULL;
    if(second==NULL)
        return temp;
    temp->link=second;
    second=temp;
    return second;
}

NODE IR(NODE second,int item)
{
    NODE temp,cur;
    temp=getnode();
    temp->info=item;
    temp->link=NULL;
    if(second==NULL)
        return temp;
    cur=second;
    while(cur->link!=NULL)
        cur=cur->link;
    cur->link=temp;
    return second;
}

NODE reverse(NODE first)
{
    NODE cur,temp;
    cur=NULL;
    while(first!=NULL)
    {
        temp=first;
        first=first->link;
        temp->link=cur;
        cur=temp;
    }
    return cur;
}
```

```
NODE ascending(NODE first)
{
    NODE prev=first;
    NODE cur=NULL;
         int temp;
         if(first== NULL)
         {
            return 0;
         }
    else
    {
             while(prev!= NULL)
             {
                 cur = prev->link;
                 while(cur!= NULL)
                 {
                if(prev->info > cur->info)
                {
                      temp = prev->info;
                         prev->info = cur->info;
                         cur->info = temp;
                     }
                     cur = cur->link;
                 }
                 prev= prev->link;
            }
         }
         return first;
}

NODE descending(NODE first)
{
    NODE prev=first;
    NODE cur=NULL;
         int temp;
         if(first==NULL)
         {
             return 0;
         }
         else
         {
             while(prev!= NULL)
             {
                 cur = prev->link;
                 while(cur!= NULL)
                 {
                if(prev->info < cur->info)
                {
                    temp = prev->info;
                  prev->info = cur->info;
                  cur->info = temp;
                     }
                     cur = cur->link;
                 }
                 prev= prev->link;
             }
    }
    return first;
}

NODE concatenate(NODE first,NODE second)
{
    NODE cur;
    if(first==NULL)
```

```
        return second;
    if(second==NULL)
        return first;
    cur=first;
    while(cur->link!=NULL)
    {
        cur=cur->link;
    }
    cur->link=second;
    return first;
}

void display(NODE first)
{
    NODE temp;
    if(first==NULL)
        printf("List is empty. Cannot display items.\n");
    printf("List contents are : ");
    for(temp=first;temp!=NULL;temp=temp->link)
    {
        printf("\n%d",temp->info);
    }
}

void main()
{
    int item,choice,pos,element,option,choice2,item1,num;
    NODE first=NULL;
    NODE second=NULL;
    for(;;)
    {
        printf("\n\nChoose an option");
        printf("\n1:Insert_front \n2:Delete_front \n3:Reverse \n4:Sort
\n5.Concatenate \n6:Display \n7:Exit\n");
        printf("Enter the choice : ");
        scanf("%d",&choice);
        switch(choice)
        {
          case 1: printf("Enter the item at front-end : ");
            scanf("%d",&item);
            first=insert_front(first,item);
            printf("%d inserted at front-end.",first->info);
            break;
          case 2: first=delete_front(first);
            break;
          case 3: first=reverse(first);
              printf("List is reversed.");
              break;
          case 4: printf("Press 1 for Ascending-sort and 2 for
Descending-sort : ");
              scanf("%d",&option);
              if(option==1)
              {
                first=ascending(first);
                printf("List is sorted in ascending order.");
              }
              if(option==2)
              {
                first=descending(first);
                printf("List is sorted in descending order.");
              }
              break;
          case 5: printf("Create a second list\n");
              printf("Enter the number of elements in the second list : ");
```

```
                    scanf("%d",&num);
                    for(int i=1;i<=num;i++)
                    {
                        printf("\nPress 1 to Insert-front and 2 to Insert-rear : ");
                        scanf("%d",&choice2);
                        if(choice2==1)
                        {
                            printf("Enter the item at front-end : ");
                         scanf("%d",&item1);
                            second=IF(second,item1);
                        }
                        if(choice2==2)
                        {
                            printf("Enter the item at rear-end : ");
                         scanf("%d",&item1);
                            second=IR(second,item1);
                        }
                    }
                    first=concatenate(first,second);
                    printf("\nThe two lists are concatenated.");
                    break;
            case 6: display(first);
                 break;
            default:exit(0);
                 break;
        }
    }
}
```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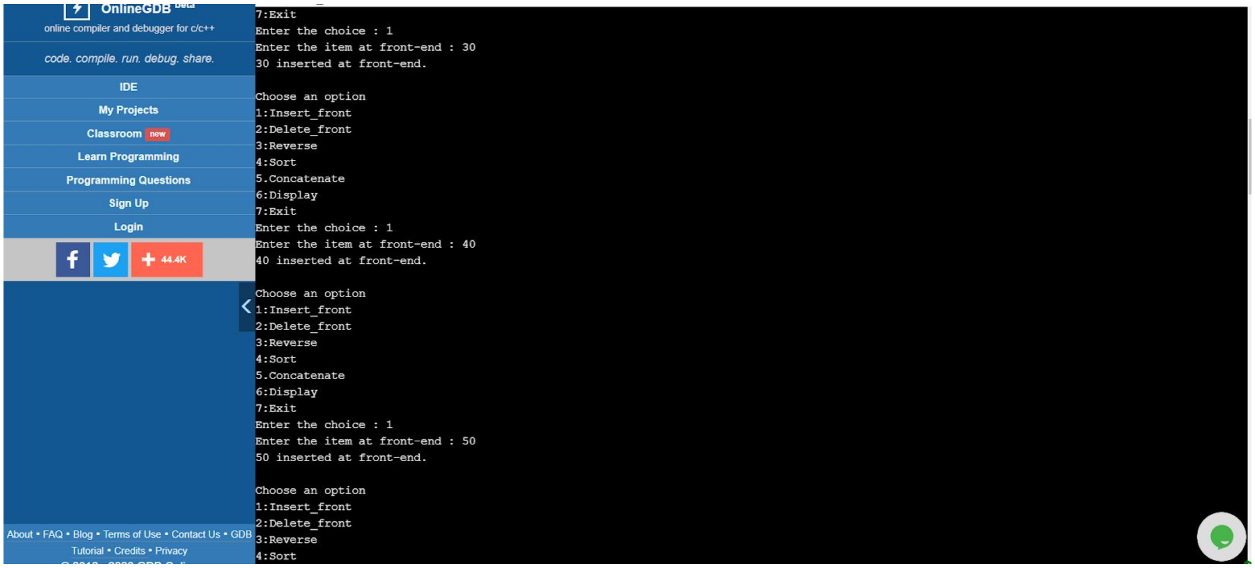
input

```
Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 10
10 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 20
20 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 30
```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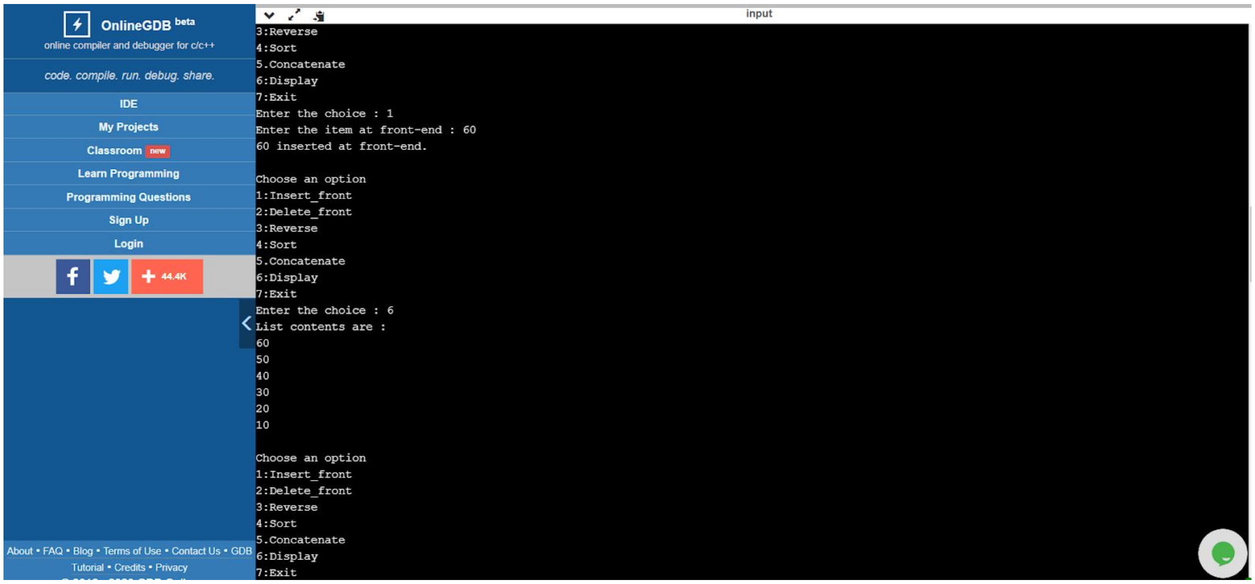
```
7:Exit
Enter the choice : 1
Enter the item at front-end : 30
30 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 40
40 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 50
50 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
```



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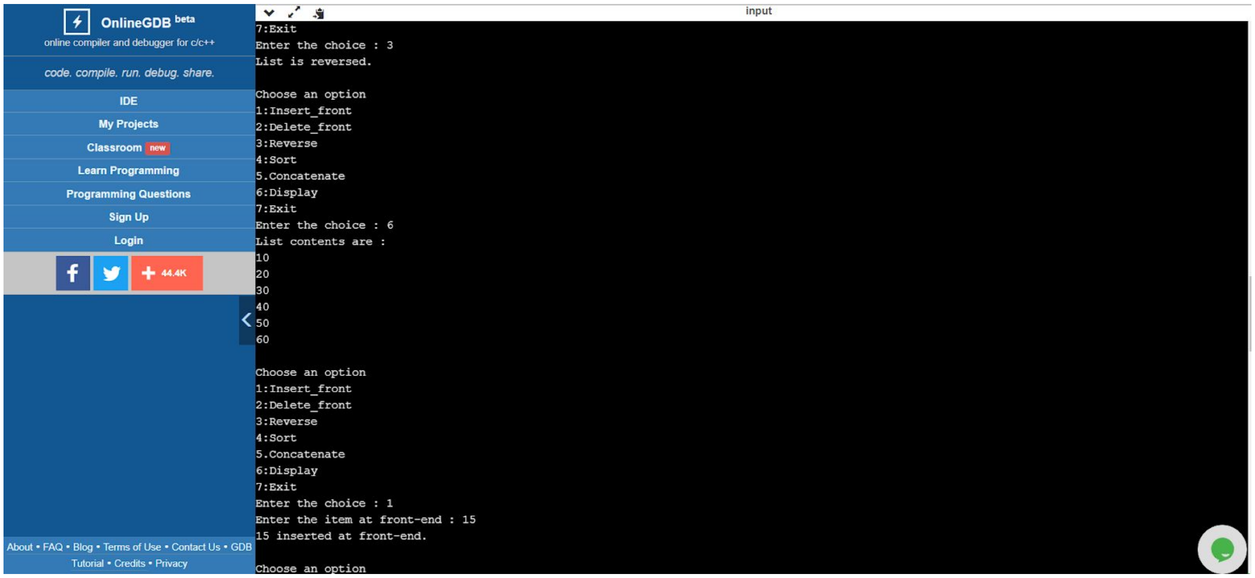
```
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 60
60 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 6
List contents are :
60
50
40
30
20
10

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
```



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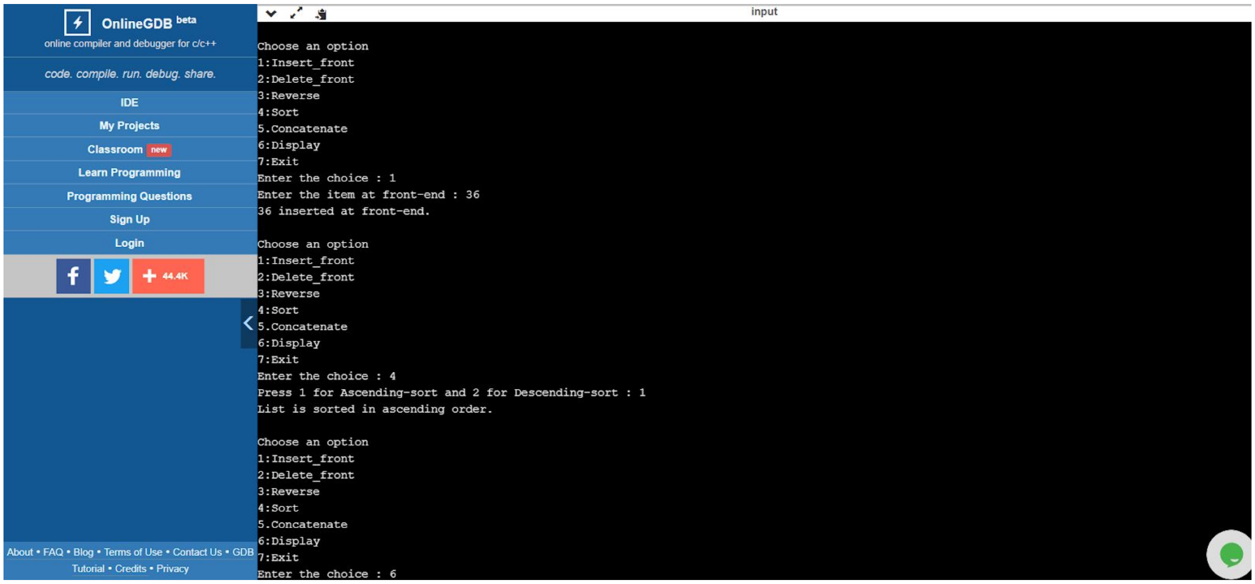
```
7:Exit
Enter the choice : 3
List is reversed.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 6
List contents are :
10
20
30
40
50
60

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 15
15 inserted at front-end.

Choose an option
```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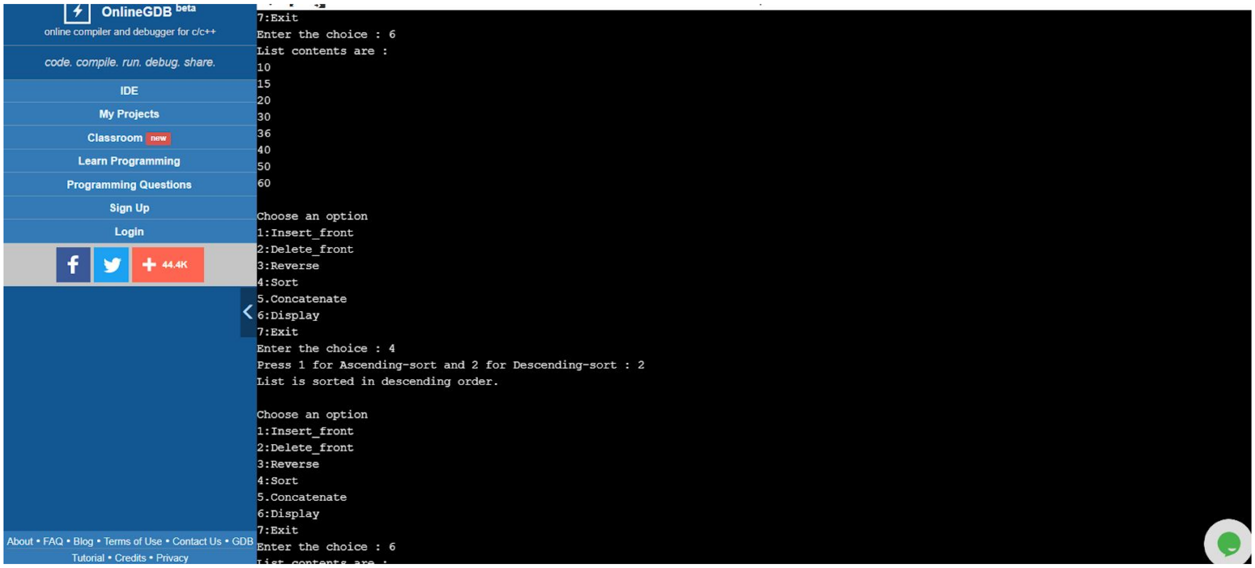
input

```
Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 1
Enter the item at front-end : 36
36 inserted at front-end.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 4
Press 1 for Ascending-sort and 2 for Descending-sort : 1
List is sorted in ascending order.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 6
```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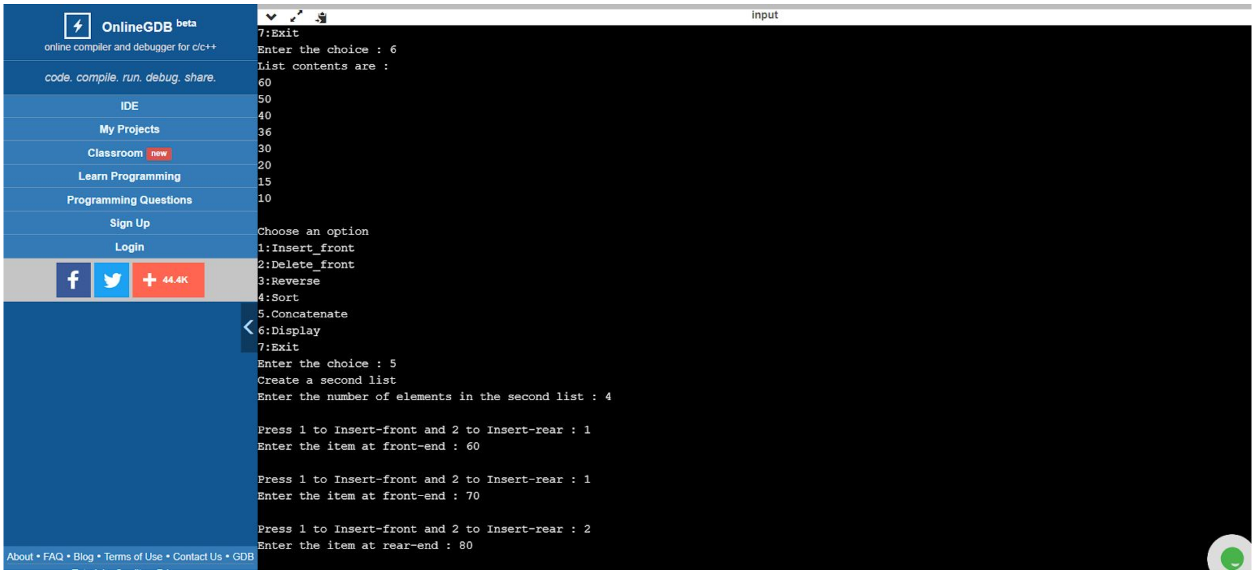
```
7:Exit
Enter the choice : 6
List contents are :
10
15
20
30
36
40
50
60

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 4
Press 1 for Ascending-sort and 2 for Descending-sort : 2
List is sorted in descending order.

Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 6
List contents are :
```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input

```
7:Exit
Enter the choice : 6
List contents are :
60
50
40
36
30
20
15
10


Choose an option
1:Insert_front
2:Delete_front
3:Reverse
4:Sort
5.Concatenate
6:Display
7:Exit
Enter the choice : 5
Create a second list
Enter the number of elements in the second list : 4

Press 1 to Insert-front and 2 to Insert-rear : 1
Enter the item at front-end : 60

Press 1 to Insert-front and 2 to Insert-rear : 1
Enter the item at front-end : 70

Press 1 to Insert-front and 2 to Insert-rear : 2
Enter the item at rear-end : 80
```