

# Rajalakshmi Engineering College

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_MCQ

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : MCQ

1. The following function reverse() is supposed to reverse a singly linked list. There is one line missing at the end of the function.

What should be added in place of "/\*ADD A STATEMENT HERE\*/", so that the function correctly reverses a linked list?

```
struct node {  
    int data;  
    struct node* next;  
};  
static void reverse(struct node** head_ref) {  
    struct node* prev = NULL;  
    struct node* current = *head_ref;  
    struct node* next;  
    while (current != NULL) {  
        next = current->next;
```

```
current->next = prev;
prev = current;
current = next;
}
/*ADD A STATEMENT HERE*/
}
```

**Answer**

```
*head_ref = prev;
```

**Status :** Correct

**Marks :** 1/1

2. Which of the following statements is used to create a new node in a singly linked list?

```
struct node {
    int data;
    struct node * next;
}
typedef struct node NODE;
NODE *ptr;
```

**Answer**

```
ptr = (NODE*)malloc(sizeof(NODE));
```

**Status :** Correct

**Marks :** 1/1

3. The following function takes a singly linked list of integers as a parameter and rearranges the elements of the lists.

The function is called with the list containing the integers 1, 2, 3, 4, 5, 6, 7 in the given order. What will be the contents of the list after the function completes execution?

```
struct node {
    int value;
    struct node* next;
};
```

```

void rearrange (struct node* list) {
    struct node *p,q;
    int temp;
    if (! List || ! list->next) return;
    p=list; q=list->next;
    while(q) {
        temp=p->value; p->value=q->value;
        q->value=temp;p=q->next;
        q=p?p->next:0;
    }
}

```

**Answer**

2, 1, 4, 3, 6, 5, 7

**Status :** Correct

**Marks :** 1/1

4. Consider the singly linked list: 15 -> 16 -> 6 -> 7 -> 17. You need to delete all nodes from the list which are prime.

What will be the final linked list after the deletion?

**Answer**

15 -> 16 -> 6

**Status :** Correct

**Marks :** 1/1

5. Linked lists are not suitable for the implementation of?

**Answer**

Binary search

**Status :** Correct

**Marks :** 1/1

6. Consider the singly linked list: 13 -> 4 -> 16 -> 9 -> 22 -> 45 -> 5 -> 16 -> 6, and an integer K = 10, you need to delete all nodes from the list that are less than the given integer K.

What will be the final linked list after the deletion?

**Answer**

13 -> 16 -> 22 -> 45 -> 16

**Status :** Correct

**Marks :** 1/1

7. Given the linked list: 5 -> 10 -> 15 -> 20 -> 25 -> NULL. What will be the output of traversing the list and printing each node's data?

**Answer**

5 10 15 20 25

**Status :** Correct

**Marks :** 1/1

8. Consider an implementation of an unsorted singly linked list. Suppose it has its representation with a head pointer only. Given the representation, which of the following operations can be implemented in  $O(1)$  time?

- i) Insertion at the front of the linked list
- ii) Insertion at the end of the linked list
- iii) Deletion of the front node of the linked list
- iv) Deletion of the last node of the linked list

**Answer**

I and III

**Status :** Correct

**Marks :** 1/1

9. Given a pointer to a node X in a singly linked list. If only one point is given and a pointer to the head node is not given, can we delete node X from the given linked list?

**Answer**

Possible if X is not last node.

**Status :** Correct

**Marks :** 1/1

10. In a singly linked list, what is the role of the "tail" node?

**Answer**

It stores the last element of the list

**Status :** Correct

**Marks :** 1/1

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 1

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Janani is a tech enthusiast who loves working with polynomials. She wants to create a program that can add polynomial coefficients and provide the sum of their coefficients.

The polynomials will be represented as a linked list, where each node of the linked list contains a coefficient and an exponent. The polynomial is represented in the standard form with descending order of exponents.

##### *Input Format*

The first line of input consists of an integer  $n$ , representing the number of terms in the first polynomial.

The following  $n$  lines of input consist of two integers each: the coefficient and the exponent of the term in the first polynomial.

The next line of input consists of an integer m, representing the number of terms in the second polynomial.

The following m lines of input consist of two integers each: the coefficient and the exponent of the term in the second polynomial.

### **Output Format**

The output prints the sum of the coefficients of the polynomials.

### **Sample Test Case**

Input: 3

2 2

3 1

4 0

3

2 2

3 1

4 0

Output: 18

### **Answer**

// You are using GCC

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

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

```
typedef struct node{
```

```
    int data1,data2;
```

```
    int exp;
```

```
    struct node *link;
```

```
}node;
```

```
int main()
```

```
{
```

```
    int n,m;
```

```
    int sum=0;
```

```
    struct node nu;
```

```
    scanf("%d",&n);
```

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

```
    {
```

```
        scanf("%d %d",&nu.data1,&nu.data2);
```

```
        sum+=nu.data1;
```

```
    }
```

```
scanf("%d",&m);  
for(int i=0;i<m;i++)  
{  
    scanf("%d %d",&nu.data1,&nu.data2);  
    sum+=nu.data1;  
}  
printf("%d",sum);  
  
}
```

**Status :** Correct

**Marks :** 10/10



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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 3

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Imagine you are working on a text processing tool and need to implement a feature that allows users to insert characters at a specific position.

Implement a program that takes user inputs to create a singly linked list of characters and inserts a new character after a given index in the list.

##### ***Input Format***

The first line of input consists of an integer N, representing the number of characters in the linked list.

The second line consists of a sequence of N characters, representing the linked list.

The third line consists of an integer index, representing the index(0-based) after

which the new character node needs to be inserted.

The fourth line consists of a character value representing the character to be inserted after the given index.

### ***Output Format***

If the provided index is out of bounds (larger than the list size):

1. The first line of output prints "Invalid index".
2. The second line prints "Updated list: " followed by the unchanged linked list values.

Otherwise, the output prints "Updated list: " followed by the updated linked list after inserting the new character after the given index.

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 5

a b c d e

2

X

Output: Updated list: a b c X d e

### ***Answer***

```
// You are using GCC
```

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

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

```
struct node{
```

```
    char data;
```

```
    struct node *next;
```

```
};
```

```
struct node *create(char data){
```

```
    struct node* newn=(struct node*)malloc(sizeof(struct node));
```

```
    newn->data=data;
```

```
    newn->next=NULL;
```

```
return newn;
```

```
}  
void insert(struct node* head,int index,char newc){
```

```
    struct node* temp=head;
```

```
    int count=0;
```

```
    while(temp!=NULL && count<index){
```

```
        temp=temp->next;
```

```
        count++;
```

```
    }
```

```
    if(temp==NULL){
```

```
        printf("Invalid index\n");
```

```
        return ;
```

```
    }
```

```
    struct node* newn=create(newc);
```

```
    newn->next=temp->next;
```

```
    temp->next=newn;
```

```
}
```

```
void print(struct node* head){
```

```
    struct node* temp=head;
```

```
    printf("Updated list: ");
```

```
    while(temp!=NULL){
```

```
        printf(" %c",temp->data);
```

```
        temp=temp->next;
```

```
    }
```

```
    printf("\n");
```

```
}
```

```
int main(){
```

```
    int n,index;
```

```
    char newc;
```

```
    struct node* head=NULL,*tail=NULL;
```

```
    scanf("%d",&n);
```

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

```
        char ch;
```

```
        scanf(" %c",&ch);
```

```
        struct node* newn=create(ch);
```

```
        if(head==NULL){
```

```
            head=newn;
```

```
        tail=newn;
    }
    else{
        tail->next=newn;
        tail=newn;

    }
}
scanf("%d",&index);
scanf(" %c",&newc);
if(index>n){
    printf("Invalid index\n");
    print(head);
}
else{
    insert(head,index,newc);
    print(head);

}
return 0;
}
```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 4

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

As part of a programming assignment in a data structures course, students are required to create a program to construct a singly linked list by inserting elements at the beginning.

You are an evaluator of the course and guide the students to complete the task.

##### ***Input Format***

The first line of input consists of an integer N, which is the number of elements.

The second line consists of N space-separated integers.

##### ***Output Format***

The output prints the singly linked list elements, after inserting them at the beginning.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 5

78 89 34 51 67

Output: 67 51 34 89 78

### **Answer**

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

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

```
struct Node {  
    int data;  
    struct Node* next;  
};
```

```
// You are using GCC
```

```
void insertAtFront(struct Node **head,int activity)
```

```
{  
    struct Node*newnode=(struct Node*)malloc(sizeof(struct Node));  
    newnode->data=activity;  
    newnode->next=*head;  
    *head=newnode;
```

```
}  
void printList(struct Node *head){  
    while(head!=NULL)  
    {  
        printf("%d ",head->data);  
        head=head->next;  
    }  
}
```

```
int main(){  
    struct Node* head = NULL;
```

```
    int n;
```

```
scanf("%d", &n);  
for (int i = 0; i < n; i++) {  
    int activity;  
    scanf("%d", &activity);  
    insertAtFront(&head, activity);  
}  
  
printList(head);  
struct Node* current = head;  
while (current != NULL) {  
    struct Node* temp = current;  
    current = current->next;  
    free(temp);  
}  
  
return 0;  
}
```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 5

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

Imagine you are tasked with developing a simple GPA management system using a singly linked list. The system allows users to input student GPA values, insertion should happen at the front of the linked list, delete record by position, and display the updated list of student GPAs.

##### ***Input Format***

The first line of input contains an integer  $n$ , representing the number of students.

The next  $n$  lines contain a single floating-point value representing the GPA of each student.

The last line contains an integer position, indicating the position at which a student record should be deleted. Position starts from 1.



### **Output Format**

After deleting the data in the given position, display the output in the format "GPA: " followed by the GPA value, rounded off to one decimal place.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 4

3.8

3.2

3.5

4.1

2

Output: GPA: 4.1

GPA: 3.2

GPA: 3.8

### **Answer**

```
// You are using GCC
```

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

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

```
typedef struct Node{
```

```
    float gpa;
```

```
    struct Node *next;
```

```
}Node;
```

```
void insertfront(Node ** head,float gpa){
```

```
    Node *newnode=(Node*)malloc(sizeof(Node));
```

```
    newnode->gpa=gpa;
```

```
    newnode->next=*head;
```

```
    *head=newnode;
```

```
}
```

```
void deleteatposition(Node** head,int position){
```

```
    if(*head==NULL)return;
```

```
    Node*temp=*head;
```

```
    if(position==1){
```

```

        *head=temp->next;
        free(temp);
        return ;
    }
    Node*prev=NULL;
    for(int i=1;temp!=NULL&& i<position;i++){
        prev=temp;
        temp=temp->next;
    }
    if(temp==NULL)return ;
    prev->next=temp->next;
    free(temp);
}
void printlist(Node *head){
    Node*temp=head;
    while(temp!=NULL){
        printf("GPA: %.1f\n",temp->gpa);
        temp=temp->next;
    }
}

int main(){
    int n,position;
    scanf("%d",&n);

    Node*head=NULL;
    for(int i=0;i<n;i++){
        float gpa;
        scanf("%f",&gpa);
        insertfront(&head,gpa);
    }

    scanf("%d",&position);
    deleteatposition(&head,position);
    printlist(head);

    return 0;
}

```

**Status : Correct**

**Marks : 10/10**

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_COD\_Question 6

Attempt : 1  
Total Mark : 10  
Marks Obtained : 10

#### Section 1 : Coding

##### 1. Problem Statement

John is tasked with creating a program to manage student roll numbers using a singly linked list.

Write a program for John that accepts students' roll numbers, inserts them at the end of the linked list, and displays the numbers.

##### ***Input Format***

The first line of input consists of an integer N, representing the number of students.

The second line consists of N space-separated integers, representing the roll numbers of students.

##### ***Output Format***

The output prints the space-separated integers singly linked list, after inserting the roll numbers of students at the end.

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 5

23 85 47 62 31

Output: 23 85 47 62 31

### **Answer**

```
// You are using GCC
#include<stdio.h>
#include<stdlib.h>
struct node{
    int data;
    node*next;
};

node*head=NULL;

void insert(int data){
    node*temp=(node*)malloc(sizeof(node));
    temp->data=data;
    if(head==NULL){
        head=temp;
    }
    else{
        node*temp1=head;
        while(temp1->next!=NULL){
            temp1=temp1->next;
        }
        temp1->next=temp;
    }
}
```

```
void print(){
    node*temp;
    temp=head;
    while(temp!=NULL){
        printf("%d ",temp->data);
        temp=temp->next;
    }
}
```

```
int main(){
    int x,n;
    scanf("%d\n",&n);
    for(int i=0;i<n;i++){
        scanf("%d",&x);
        insert(x);
    }
    print();
    return 0;
}
```

**Status :** Correct

**Marks :** 10/10

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## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_week 1\_CY

Attempt : 1  
Total Mark : 30  
Marks Obtained : 7.5

### Section 1 : Coding

#### 1. Problem Statement

Keerthi is a tech enthusiast and is fascinated by polynomial expressions. She loves to perform various operations on polynomials.

Today, she is working on a program to multiply two polynomials and delete a specific term from the result.

Keerthi needs your help to implement this program. She wants to take the coefficients and exponents of the terms of the two polynomials as input, perform the multiplication, and then allow the user to specify an exponent for deletion from the resulting polynomial, and display the result.

#### ***Input Format***

The first line of input consists of an integer n, representing the number of terms

in the first polynomial.

The following  $n$  lines of input consist of two integers, each representing the coefficient and the exponent of the term in the first polynomial.

The next line consists of an integer  $m$ , representing the number of terms in the second polynomial.

The following  $m$  lines of input consist of two integers, each representing the coefficient and the exponent of the term in the second polynomial.

The last line consists of an integer, representing the exponent of the term that Keerthi wants to delete from the multiplied polynomial.

### **Output Format**

The first line of output displays the resulting polynomial after multiplication.

The second line displays the resulting polynomial after deleting the specified term.

Refer to the sample output for the formatting specifications.

### **Sample Test Case**

Input: 3

2 2

3 1

4 0

2

1 2

2 1

2

Output: Result of the multiplication:  $2x^4 + 7x^3 + 10x^2 + 8x$

Result after deleting the term:  $2x^4 + 7x^3 + 8x$

### **Answer**

```
// You are using GCC
```

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

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



```
typedef struct Term{
    int coef;
    int expr;
```

```
}Term;
```

```
typedef struct polynomial{
    Term terms[100];
    int size;
```

```
}polynomial;
```

```
polynomial
multiplypolynomials(polynomial p1,polynomial p2){
    polynomial result;
    result.size=0;
```

```
    for(int i=0;i<p1.size;i++){
        for(int j=0;j<p2.size;j++){
            {
                int coef=p1.terms[i].coef*p2.terms[j].coef;
                int expr=p1.terms[i].expr+p2.terms[j].expr;
                int found=0;
                for(int k=0;k<result.size;k++){
                    {
                        if(result.terms[k].expr==expr){
                            result.terms[k].coef+=coef;
                            found=1;
                            break;
                        }
                    }
                }
                if(!found){
                    result.terms[result.size].coef=coef;
                    result.terms[result.size].expr=expr;
                    result.size++;
                }
            }
        }
    }
```

```
    return result;
```

```

}
polynomial removeterm(polynomial poly,int exptoremove){
    polynomial result;
    result.size=0;
    for(int i=0;i<poly.size;i++)
    {
        if(poly.terms[i].expr!=exptoremove){
            result.terms[result.size]=poly.terms[i];
            result.size++;
        }
    }
    return result;
}

```

```

void printpolynomial(polynomial poly){
    if(poly.size==0){
        printf("0\n");
        return;
    }
    for(int i=0;i<poly.size;i++){
        if(i>0)printf(" + ");
        printf("%dx^%d",poly.terms[i].coef,poly.terms[i].expr);
    }
    printf("\n");
}

```

```

int main(){
    polynomial p1,p2,result;
    int exptoremove;
    scanf("%d",&p1.size);
    for(int i=0;i<p1.size;i++){
        scanf("%d %d",&p1.terms[i].coef,&p1.terms[i].expr);
    }
    scanf("%d",&p2.size);
    for(int i=0;i<p2.size;i++){
        scanf("%d %d",&p2.terms[i].coef,&p2.terms[i].expr);
    }
}

```

```

    }
    scanf("%d",&exptoremove);

    result=multiplyphynomials(p1,p2);

    printf("Result of the multiplication: ");
    printpolynomial(result);

    result=removeterm(result,exptoremove);

    printf("Result after deleting the term: ");
    printpolynomial(result);

    return 0;
}

```

**Status :** Partially correct

**Marks :** 7.5/10

## 2. Problem Statement

Lisa is studying polynomials in her class. She is learning about the multiplication of polynomials.

To practice her understanding, she wants to write a program that multiplies two polynomials and displays the result. Each polynomial is represented as a linked list, where each node contains the coefficient and exponent of a term.

Example

Input:

4 3

y

3 1

y

1 0

n

2 2

y

3 1

y

2 0

n

Output:

$$8x^5 + 12x^4 + 14x^3 + 11x^2 + 9x + 2$$

Explanation

1. Poly1:  $4x^3 + 3x + 1$

2. Poly2:  $2x^2 + 3x + 2$

Multiplication Steps:

1. Multiply  $4x^3$  by Poly2:

$$\rightarrow 4x^3 * 2x^2 = 8x^5$$

$$\rightarrow 4x^3 * 3x = 12x^4$$

$$\rightarrow 4x^3 * 2 = 8x^3$$

2. Multiply  $3x$  by Poly2:

$$\rightarrow 3x * 2x^2 = 6x^3$$

$$\rightarrow 3x * 3x = 9x^2$$

$$\rightarrow 3x * 2 = 6x$$

3. Multiply 1 by Poly2:

$$\rightarrow 1 * 2x^2 = 2x^2$$

$$\rightarrow 1 * 3x = 3x$$

$$\rightarrow 1 * 2 = 2$$

Combine the results:  $8x^5 + 12x^4 + (8x^3 + 6x^3) + (9x^2 + 2x^2) + (6x + 3x) + 2$

The combined polynomial is:  $8x^5 + 12x^4 + 14x^3 + 11x^2 + 9x + 2$

### ***Input Format***

The input consists of two sets of polynomial terms.

Each polynomial term is represented by two integers separated by a space:

- The first integer represents the coefficient of the term.
- The second integer represents the exponent of the term.

After entering a polynomial term, the user is prompted to input a character indicating whether to continue adding more terms to the polynomial.

If the user inputs 'y' or 'Y', the program continues to accept more terms.

If the user inputs 'n' or 'N', the program moves on to the next polynomial.

### ***Output Format***

The output consists of a single line representing the resulting polynomial after multiplying the two input polynomials.

Each term of the resulting polynomial is formatted as follows:

- The coefficient and exponent are separated by 'x^' if the exponent is greater than 1.
- If the exponent is 1, only 'x' is displayed without the exponent.
- If the exponent is 0, only the coefficient is displayed.

Refer to the sample output for the formatting specifications.

**Sample Test Case**

Input: 4 3

y

3 1

y

1 0

n

2 2

y

3 1

y

2 0

n

Output:  $8x^5 + 12x^4 + 14x^3 + 11x^2 + 9x + 2$

**Answer**

-

**Status :** Skipped

**Marks :** 0/10

### 3. Problem Statement

Rani is studying polynomials in her class. She has learned about polynomial multiplication and is eager to try it out on her own. However, she finds the process of manually multiplying polynomials quite tedious. To make her task easier, she decides to write a program to multiply two polynomials represented as linked lists.

Help Rani by designing a program that takes two polynomials as input and outputs their product polynomial. Each polynomial is represented by a linked list of terms, where each term has a coefficient and an exponent. The terms are entered in descending order of exponents.

**Input Format**

The first line of input consists of an integer  $n$ , representing the number of terms in the first polynomial.

The following  $n$  lines of input consist of two integers each: the coefficient and the exponent of the term in the first polynomial.

The next line of input consists of an integer  $m$ , representing the number of terms in the second polynomial.

The following  $m$  lines of input consist of two integers each: the coefficient and the exponent of the term in the second polynomial.

### **Output Format**

The first line of output prints the first polynomial.

The second line of output prints the second polynomial.

The third line of output prints the resulting polynomial after multiplying the given polynomials.

The polynomials should be displayed in the format, where each term is represented as  $ax^b$ , where  $a$  is the coefficient and  $b$  is the exponent.

Refer to the sample output for the exact format.

### **Sample Test Case**

Input: 2

2 3

3 2

2

3 2

2 1

Output:  $2x^3 + 3x^2$

$3x^2 + 2x$

$6x^5 + 13x^4 + 6x^3$

### **Answer**

-

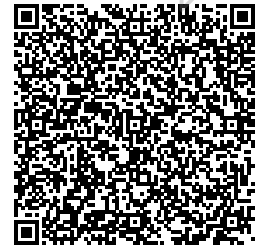
**Status :** Skipped

**Marks :** 0/10

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Scan to verify results



## NeoColab\_REC\_CS23231\_DATA STRUCTURES

### REC\_DS using C\_Week 1\_PAH\_modified

Attempt : 1  
Total Mark : 5  
Marks Obtained : 5

#### Section 1 : Coding

##### 1. Problem Statement

Write a program to manage a singly linked list. The program should allow users to perform various operations on the linked list, such as inserting elements at the beginning or end, deleting elements from the beginning or end, inserting before or after a specific value, and deleting elements before or after a specific value. After each operation, the updated linked list should be displayed.

##### ***Input Format***

The first line contains an integer choice, representing the operation to perform:

- For choice 1 to create the linked list. The next lines contain space-separated integers, with -1 indicating the end of input.
- For choice 2 to display the linked list.
- For choice 3 to insert a node at the beginning. The next line contains an integer



data representing the value to insert.

- For choice 4 to insert a node at the end. The next line contains an integer data representing the value to insert.
- For choice 5 to insert a node before a specific value. The next line contains two integers: value (existing node value) and data (value to insert).
- For choice 6 to insert a node after a specific value. The next line contains two integers: value (existing node value) and data (value to insert).
- For choice 7 to delete a node from the beginning.
- For choice 8 to delete a node from the end.
- For choice 9 to delete a node before a specific value. The next line contains an integer value representing the node before which deletion occurs.
- For choice 10 to delete a node after a specific value. The next line contains an integer value representing the node after which deletion occurs.
- For choice 11 to exit the program.

### **Output Format**

For choice 1, print "LINKED LIST CREATED".

For choice 2, print the linked list as space-separated integers on a single line. If the list is empty, print "The list is empty".

For choice 3, 4, 5, and 6, print the updated linked list with a message indicating the insertion operation.

For choice 7, 8, 9, and 10, print the updated linked list with a message indicating the deletion operation.

For any operation that is not possible print an appropriate error message such as "Value not found in the list".

For choice 11 terminate the program.

For any invalid option, print "Invalid option! Please try again".

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 1

5

3  
7  
-1  
2  
11

Output: LINKED LIST CREATED  
5 3 7

### **Answer**

```
// You are using GCC
#include <stdio.h>
#include <stdlib.h>
```

```
struct Node {
    int data;
    struct Node* next;
};
```

```
struct Node* head = NULL;
```

```
void createLinkedList() {
    int data;
    while (1) {
        scanf("%d", &data);
        if (data == -1) break;
```

```
        struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
        newNode->data = data;
        newNode->next = NULL;
```

```
        if (head == NULL) {
            head = newNode;
        } else {
            struct Node* temp = head;
            while (temp->next != NULL) {
                temp = temp->next;
            }
            temp->next = newNode;
```

```
        }
    }
    printf("LINKED LIST CREATED\n");
}
```

```
void displayLinkedList() {  
    if (head == NULL) {  
        printf("The list is empty\n");  
        return;  
    }  
}
```

```
    struct Node* temp = head;  
    while (temp != NULL) {  
        printf("%d ", temp->data);  
        temp = temp->next;  
    }  
    printf("\n");  
}
```

```
void insertAtBeginning(int data) {  
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));  
    newNode->data = data;  
    newNode->next = head;  
    head = newNode;  
    printf("The linked list after insertion at the beginning is:\n");  
    displayLinkedList();  
}
```

```
void insertAtEnd(int data) {  
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));  
    newNode->data = data;  
    newNode->next = NULL;  
  
    if (head == NULL) {  
        head = newNode;  
    } else {  
        struct Node* temp = head;  
        while (temp->next != NULL) {  
            temp = temp->next;  
        }  
        temp->next = newNode;  
    }  
    printf("The linked list after insertion at the end is:\n");  
    displayLinkedList();  
}
```

```

void insertBeforeValue(int value, int data) {
    if (head == NULL) {
        printf("Value not found in the list\n");
        printf("The linked list after insertion before a value is:\n");
        displayLinkedList();
        return;
    }

    if (head->data == value) {
        insertAtBeginning(data);
        return;
    }

    struct Node* prev = NULL;
    struct Node* curr = head;

    while (curr != NULL && curr->data != value) {
        prev = curr;
        curr = curr->next;
    }

    if (curr == NULL) {
        printf("Value not found in the list\n");
        printf("The linked list after insertion before a value is:\n");
        displayLinkedList();
        return;
    }

    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = data;
    newNode->next = curr;
    prev->next = newNode;

    printf("The linked list after insertion before a value is:\n");
    displayLinkedList();
}

```

```

void insertAfterValue(int value, int data) {
    if (head == NULL) {
        printf("Value not found in the list\n");
        printf("The linked list after insertion after a value is:\n");
        displayLinkedList();
    }
}

```

```
        return;
    }

    struct Node* temp = head;
    while (temp != NULL && temp->data != value) {
        temp = temp->next;
    }

    if (temp == NULL) {
        printf("Value not found in the list\n");
        printf("The linked list after insertion after a value is:\n");
        displayLinkedList();
        return;
    }

    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = data;
    newNode->next = temp->next;
    temp->next = newNode;

    printf("The linked list after insertion after a value is:\n");
    displayLinkedList();
}
```

```
void deleteFromBeginning() {
    if (head == NULL) {
        printf("The list is empty\n");
        return;
    }
}
```

```
    struct Node* temp = head;
    head = head->next;
    free(temp);

    printf("The linked list after deletion from the beginning is:\n");
    displayLinkedList();
}
```

```
void deleteFromEnd() {
    if (head == NULL) {
        printf("The list is empty\n");
        return;
    }
}
```

```

    }
    if (head->next == NULL) {
        free(head);
        head = NULL;
    } else {
        struct Node* prev = NULL;
        struct Node* curr = head;

        while (curr->next != NULL) {
            prev = curr;
            curr = curr->next;
        }
        prev->next = NULL;
        free(curr);
    }

    printf("The linked list after deletion from the end is:\n");
    displayLinkedList();
}

void deleteBeforeValue(int value) {
    if (head == NULL || head->next == NULL) {
        printf("Deletion not possible\n");
        return;
    }

    // Special case: value is in third node (delete first node)
    if (head->next->next != NULL && head->next->next->data == value) {
        struct Node* temp = head;
        head = head->next;
        free(temp);
        printf("The linked list after deletion before a value is:\n");
        displayLinkedList();
        return;
    }

    struct Node* prevPrevPrev = NULL; // three nodes back
    struct Node* prevPrev = NULL;    // two nodes back
    struct Node* prev = head;        // one node back
    struct Node* curr = head->next;   // current node

```

```

while (curr != NULL && curr->data != value) {
    prevPrevPrev = prevPrev;
    prevPrev = prev;
    prev = curr;
    curr = curr->next;
}

if (curr == NULL) {
    printf("Value not found in the list\n");
    return;
}

// Now delete the node two positions before curr (which is prevPrev)
if (prevPrev == NULL) {
    printf("Deletion not possible\n");
    return;
}

if (prevPrevPrev == NULL) {
    // Deleting the head node
    head = prev;
    free(prevPrev);
} else {
    prevPrevPrev->next = prev;
    free(prevPrev);
}

printf("The linked list after deletion before a value is:\n");
displayLinkedList();
}

void deleteAfterValue(int value) {
    if (head == NULL) {
        printf("The list is empty\n");
        return;
    }

    struct Node* temp = head;
    while (temp != NULL && temp->data != value) {
        temp = temp->next;
    }
}

```

```
if (temp == NULL || temp->next == NULL) {  
    printf("Deletion not possible\n");  
    return;  
}
```

```
struct Node* nodeToDelete = temp->next;  
temp->next = nodeToDelete->next;  
free(nodeToDelete);
```

```
printf("The linked list after deletion after a value is:\n");  
displayLinkedList();  
}
```

```
int main() {  
    int choice, data, value;  
  
    while (1) {  
        scanf("%d", &choice);  
  
        switch (choice) {  
            case 1:  
                createLinkedList();  
                break;  
            case 2:  
                displayLinkedList();  
                break;  
            case 3:  
                scanf("%d", &data);  
                insertAtBeginning(data);  
                break;  
            case 4:  
                scanf("%d", &data);  
                insertAtEnd(data);  
                break;  
            case 5:  
                scanf("%d %d", &value, &data);  
                insertBeforeValue(value, data);  
                break;  
            case 6:  
                scanf("%d %d", &value, &data);  
                insertAfterValue(value, data);  
                break;
```



```

        case 7:
            deleteFromBeginning();
            break;
        case 8:
            deleteFromEnd();
            break;
        case 9:
            scanf("%d", &value);
            deleteBeforeValue(value);
            break;
        case 10:
            scanf("%d", &value);
            deleteAfterValue(value);
            break;
        case 11:
            exit(0);
        default:
            printf("Invalid option! Please try again\n");
    }
}

return 0;
}

```

**Status :** Correct

**Marks :** 1/1

## 2. Problem Statement

Bharath is very good at numbers. As he is piled up with many works, he decides to develop programs for a few concepts to simplify his work. As a first step, he tries to arrange even and odd numbers using a linked list. He stores his values in a singly-linked list.

Now he has to write a program such that all the even numbers appear before the odd numbers. Finally, the list is printed in such a way that all even numbers come before odd numbers. Additionally, the even numbers should be in reverse order, while the odd numbers should maintain their original order.

Example

Input:

6

3 1 0 4 30 12

Output:

12 30 4 0 3 1

Explanation:

Even elements: 0 4 30 12

Reversed Even elements: 12 30 4 0

Odd elements: 3 1

So the final list becomes: 12 30 4 0 3 1

### ***Input Format***

The first line consists of an integer  $n$  representing the size of the linked list.

The second line consists of  $n$  integers representing the elements separated by space.

### ***Output Format***

The output prints the rearranged list separated by a space.

The list is printed in such a way that all even numbers come before odd numbers and the even numbers should be in reverse order, while the odd numbers should maintain their original order.

Refer to the sample output for the formatting specifications.

### ***Sample Test Case***

Input: 6

3 1 0 4 30 12

Output: 12 30 4 0 3 1

**Answer**

```
// You are using GCC
#include <stdio.h>
#include <stdlib.h>
```

```
struct Node {
    int data;
    struct Node* next;
};
```

```
struct Node* newNode(int data) {
    struct Node* node = (struct Node*)malloc(sizeof(struct Node));
    node->data = data;
    node->next = NULL;
    return node;
}
```

```
void append(struct Node** head, int data) {
    struct Node* new_node = newNode(data);
    if (*head == NULL) {
        *head = new_node;
        return;
    }
    struct Node* temp = *head;
    while (temp->next != NULL) {
        temp = temp->next;
    }
    temp->next = new_node;
}
```

```
struct Node* reverse(struct Node* head) {
    struct Node* prev = NULL;
    struct Node* current = head;
    struct Node* next = NULL;
    while (current != NULL) {
        next = current->next;
        current->next = prev;
        prev = current;
        current = next;
    }
```

```
    }  
    return prev;  
}
```

```
void printList(struct Node* head) {  
    struct Node* temp = head;  
    while (temp != NULL) {  
        printf("%d ", temp->data);  
        temp = temp->next;  
    }  
    printf("\n");  
}
```

```
int main() {  
    int n;  
    scanf("%d", &n);
```

```
    struct Node *evenList = NULL, *oddList = NULL;  
    int num;
```

```
    for (int i = 0; i < n; i++) {  
        scanf("%d", &num);  
        if (num % 2 == 0) {  
            append(&evenList, num);  
        } else {  
            append(&oddList, num);  
        }  
    }
```

```
    evenList = reverse(evenList);
```

```
    printList(evenList);  
    printList(oddList);
```

```
    return 0;  
}
```

**Status :** Correct

**Marks :** 1/1

### 3. Problem Statement

Emily is developing a program to manage a singly linked list. The program should allow users to perform various operations on the linked list, such as inserting elements at the beginning or end, deleting elements from the beginning or end, inserting before or after a specific value, and deleting elements before or after a specific value. After each operation, the updated linked list should be displayed.

Your task is to help Emily in implementing the same.

#### ***Input Format***

The first line contains an integer choice, representing the operation to perform:

- For choice 1 to create the linked list. The next lines contain space-separated integers, with -1 indicating the end of input.
- For choice 2 to display the linked list.
- For choice 3 to insert a node at the beginning. The next line contains an integer data representing the value to insert.
- For choice 4 to insert a node at the end. The next line contains an integer data representing the value to insert.
- For choice 5 to insert a node before a specific value. The next line contains two integers: value (existing node value) and data (value to insert).
- For choice 6 to insert a node after a specific value. The next line contains two integers: value (existing node value) and data (value to insert).
- For choice 7 to delete a node from the beginning.
- For choice 8 to delete a node from the end.
- For choice 9 to delete a node before a specific value. The next line contains an integer value representing the node before which deletion occurs.
- For choice 10 to delete a node after a specific value. The next line contains an integer value representing the node after which deletion occurs.
- For choice 11 to exit the program.

#### ***Output Format***

For choice 1, print "LINKED LIST CREATED".

For choice 2, print the linked list as space-separated integers on a single line. If the list is empty, print "The list is empty".

For choice 3, 4, 5, and 6, print the updated linked list with a message indicating the insertion operation.

For choice 7, 8, 9, and 10, print the updated linked list with a message indicating the deletion operation.

For any operation that is not possible print an appropriate error message such as "Value not found in the list".

For choice 11 terminate the program.

For any invalid option, print "Invalid option! Please try again".

Refer to the sample output for formatting specifications.

### **Sample Test Case**

Input: 1

5

3

7

-1

2

11

Output: LINKED LIST CREATED

5 3 7

### **Answer**

```
// You are using GCC
```

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

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

```
struct Node {  
    int data;  
    struct Node* next;  
};
```

```
struct Node* head = NULL;
```

```
void createLinkedList() {  
    int data;
```

```
while (1) {
    scanf("%d", &data);
    if (data == -1) break;

    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = data;
    newNode->next = NULL;

    if (head == NULL) {
        head = newNode;
    } else {
        struct Node* temp = head;
        while (temp->next != NULL) {
            temp = temp->next;
        }
        temp->next = newNode;
    }
}
printf("LINKED LIST CREATED\n");
}
```

```
void displayLinkedList() {
    if (head == NULL) {
        printf("The list is empty\n");
        return;
    }

    struct Node* temp = head;
    while (temp != NULL) {
        printf("%d ", temp->data);
        temp = temp->next;
    }
    printf("\n");
}
```

```
void insertAtBeginning(int data) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = data;
    newNode->next = head;
    head = newNode;
    printf("The linked list after insertion at the beginning is:\n");
    displayLinkedList();
}
```

```
}
```

```
void insertAtEnd(int data) {  
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));  
    newNode->data = data;  
    newNode->next = NULL;  
  
    if (head == NULL) {  
        head = newNode;  
    } else {  
        struct Node* temp = head;  
        while (temp->next != NULL) {  
            temp = temp->next;  
        }  
        temp->next = newNode;  
    }  
    printf("The linked list after insertion at the end is:\n");  
    displayLinkedList();  
}
```

```
void insertBeforeValue(int value, int data) {  
    if (head == NULL) {  
        printf("Value not found in the list\n");  
        printf("The linked list after insertion before a value is:\n");  
        displayLinkedList();  
        return;  
    }  
  
    if (head->data == value) {  
        insertAtBeginning(data);  
        return;  
    }  
}
```

```
struct Node* prev = NULL;  
struct Node* curr = head;
```

```
while (curr != NULL && curr->data != value) {  
    prev = curr;  
    curr = curr->next;  
}
```

```
if (curr == NULL) {
```



```
printf("Value not found in the list\n");
printf("The linked list after insertion before a value is:\n");
displayLinkedList();
return;
}
```

```
struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
newNode->data = data;
newNode->next = curr;
prev->next = newNode;
```

```
printf("The linked list after insertion before a value is:\n");
displayLinkedList();
}
```

```
void insertAfterValue(int value, int data) {
    if (head == NULL) {
        printf("Value not found in the list\n");
        printf("The linked list after insertion after a value is:\n");
        displayLinkedList();
        return;
    }
```

```
    struct Node* temp = head;
    while (temp != NULL && temp->data != value) {
        temp = temp->next;
    }
```

```
    if (temp == NULL) {
        printf("Value not found in the list\n");
        printf("The linked list after insertion after a value is:\n");
        displayLinkedList();
        return;
    }
```

```
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->data = data;
    newNode->next = temp->next;
    temp->next = newNode;
```

```
    printf("The linked list after insertion after a value is:\n");
    displayLinkedList();
```

```
}
```

```
void deleteFromBeginning() {  
    if (head == NULL) {  
        printf("The list is empty\n");  
        return;  
    }  
}
```

```
    struct Node* temp = head;  
    head = head->next;  
    free(temp);
```

```
    printf("The linked list after deletion from the beginning is:\n");  
    displayLinkedList();  
}
```

```
void deleteFromEnd() {  
    if (head == NULL) {  
        printf("The list is empty\n");  
        return;  
    }  
}
```

```
    if (head->next == NULL) {  
        free(head);  
        head = NULL;  
    } else {  
        struct Node* prev = NULL;  
        struct Node* curr = head;  
  
        while (curr->next != NULL) {  
            prev = curr;  
            curr = curr->next;  
        }  
}
```

```
    prev->next = NULL;  
    free(curr);  
}
```

```
    printf("The linked list after deletion from the end is:\n");  
    displayLinkedList();  
}
```

```

void deleteBeforeValue(int value) {
    if (head == NULL || head->next == NULL) {
        printf("Deletion not possible\n");
        return;
    }

    if (head->next->next != NULL && head->next->next->data == value) {
        struct Node* temp = head;
        head = head->next;
        free(temp);
        printf("The linked list after deletion before a value is:\n");
        displayLinkedList();
        return;
    }

    struct Node* prevPrevPrev = NULL;
    struct Node* prevPrev = NULL;
    struct Node* prev = head;
    struct Node* curr = head->next;

    while (curr != NULL && curr->data != value) {
        prevPrevPrev = prevPrev;
        prevPrev = prev;
        prev = curr;
        curr = curr->next;
    }

    if (curr == NULL) {
        printf("Value not found in the list\n");
        return;
    }

    if (prevPrev == NULL) {
        printf("Deletion not possible\n");
        return;
    }

    if (prevPrevPrev == NULL) {
        head = prev;
        free(prevPrev);
    } else {
        prevPrevPrev->next = prev;
    }
}

```

```
        free(prevPrev);
    }

    printf("The linked list after deletion before a value is:\n");
    displayLinkedList();
}
```

```
void deleteAfterValue(int value) {
    if (head == NULL) {
        printf("The list is empty\n");
        return;
    }
```

```
    struct Node* temp = head;
    while (temp != NULL && temp->data != value) {
        temp = temp->next;
    }
```

```
    if (temp == NULL || temp->next == NULL) {
        printf("Deletion not possible\n");
        return;
    }
```

```
    struct Node* nodeToDelete = temp->next;
    temp->next = nodeToDelete->next;
    free(nodeToDelete);
```

```
    printf("The linked list after deletion after a value is:\n");
    displayLinkedList();
}
```

```
int main() {
    int choice, data, value;
```

```
    while (1) {
        scanf("%d", &choice);
```

```
        switch (choice) {
            case 1:
                createLinkedList();
                break;
            case 2:
```

```

        displayLinkedList();
        break;
    case 3:
        scanf("%d", &data);
        insertAtBeginning(data);
        break;
    case 4:
        scanf("%d", &data);
        insertAtEnd(data);
        break;
    case 5:
        scanf("%d %d", &value, &data);
        insertBeforeValue(value, data);
        break;
    case 6:
        scanf("%d %d", &value, &data);
        insertAfterValue(value, data);
        break;
    case 7:
        deleteFromBeginning();
        break;
    case 8:
        deleteFromEnd();
        break;
    case 9:
        scanf("%d", &value);
        deleteBeforeValue(value);
        break;
    case 10:
        scanf("%d", &value);
        deleteAfterValue(value);
        break;
    case 11:
        exit(0);
    default:
        printf("Invalid option! Please try again\n");
    }
}

return 0;
}

```

Status : Correct

Marks : 1/1

#### 4. Problem Statement

Imagine you are managing the backend of an e-commerce platform. Customers place orders at different times, and the orders are stored in two separate linked lists. The first list holds the orders from morning, and the second list holds the orders from the evening.

Your task is to merge the two lists so that the final list holds all orders in sequence from the morning list followed by the evening orders, in the same order

##### **Input Format**

The first line contains an integer  $n$ , representing the number of orders in the morning list.

The second line contains  $n$  space-separated integers representing the morning orders.

The third line contains an integer  $m$ , representing the number of orders in the evening list.

The fourth line contains  $m$  space-separated integers representing the evening orders.

##### **Output Format**

The output should be a single line containing space-separated integers representing the merged order list, with morning orders followed by evening orders.

Refer to the sample output for formatting specifications.

##### **Sample Test Case**

Input: 3  
101 102 103

2

104 105

Output: 101 102 103 104 105

### **Answer**

// You are using GCC

#include <stdio.h>

#include <stdlib.h>

```
struct Node {  
    int order_id;  
    struct Node* next;  
};
```

```
struct Node* createNode(int order_id) {  
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));  
    newNode->order_id = order_id;  
    newNode->next = NULL;  
    return newNode;  
}
```

```
void appendNode(struct Node** head, int order_id) {  
    struct Node* newNode = createNode(order_id);
```

```
    if (*head == NULL) {  
        *head = newNode;  
    } else {
```

```
        struct Node* temp = *head;  
        while (temp->next != NULL) {  
            temp = temp->next;  
        }
```

```
        temp->next = newNode;
```

```
    }  
}
```

```
void printList(struct Node* head) {
    struct Node* temp = head;
    while (temp != NULL) {
        printf("%d ", temp->order_id);
        temp = temp->next;
    }
    printf("\n");
}
```

```
struct Node* mergeLists(struct Node* morning, struct Node* evening) {
    if (morning == NULL) return evening;
    if (evening == NULL) return morning;

    struct Node* temp = morning;
    while (temp->next != NULL) {
        temp = temp->next;
    }
```

```
    temp->next = evening;
```

```
    return morning;
}
```

```
int main() {
    int n, m;
```

```
    scanf("%d", &n);
```

```
    struct Node* morning = NULL;
```

```
    for (int i = 0; i < n; i++) {
        int order_id;
        scanf("%d", &order_id);
        appendNode(&morning, order_id);
    }
```



```
scanf("%d", &m);

struct Node* evening = NULL;

for (int i = 0; i < m; i++) {
    int order_id;
    scanf("%d", &order_id);
    appendNode(&evening, order_id);
}

struct Node* mergedList = mergeLists(morning, evening);

printList(mergedList);

return 0;
}
```

**Status :** Correct

**Marks :** 1/1

## 5. Problem Statement

John is working on evaluating polynomials for his math project. He needs to compute the value of a polynomial at a specific point using a singly linked list representation.

Help John by writing a program that takes a polynomial and a value of x as input, and then outputs the computed value of the polynomial.

Example

Input:

2

13

12

11  
1

Output:

36

Explanation:

The degree of the polynomial is 2.

Calculate the value of  $x_2$ :  $13 * 12 = 13$ .

Calculate the value of  $x_1$ :  $12 * 11 = 12$ .

Calculate the value of  $x_0$ :  $11 * 10 = 11$ .

Add the values of  $x_2$ ,  $x_1$  and  $x_0$  together:  $13 + 12 + 11 = 36$ .

### ***Input Format***

The first line of input consists of the degree of the polynomial.

The second line consists of the coefficient  $x_2$ .

The third line consists of the coefficient of  $x_1$ .

The fourth line consists of the coefficient  $x_0$ .

The fifth line consists of the value of  $x$ , at which the polynomial should be evaluated.

### ***Output Format***

The output is the integer value obtained by evaluating the polynomial at the given value of  $x$ .

Refer to the sample output for formatting specifications.

### ***Sample Test Case***

Input: 2  
13

12  
11  
1

Output: 36

### **Answer**

```
// You are using GCC
#include <stdio.h>
#include <stdlib.h>
#include <math.h>
```

```
struct Node {
    int coef;
    int exp;
    struct Node* next;
};
```

```
struct Node* createNode(int coef, int exp) {
    struct Node* newNode = (struct Node*)malloc(sizeof(struct Node));
    newNode->coef = coef;
    newNode->exp = exp;
    newNode->next = NULL;
    return newNode;
}
```

```
int evaluatePolynomial(struct Node* head, int x) {
    int result = 0;
    struct Node* current = head;
```

```
    while (current != NULL) {
        result += current->coef * (int)pow(x, current->exp);
        current = current->next;
    }
```

```
    return result;
}
```

```
int main() {
```

```
int degree;

scanf("%d", &degree);

struct Node* head = NULL;
struct Node* temp = NULL;

for (int i = degree; i >= 0; i--) {
    int coef;
    scanf("%d", &coef);

    struct Node* newNode = createNode(coef, i);

    if (head == NULL) {
        head = newNode;
    } else {
        temp->next = newNode;
    }

    temp = newNode;
}

int x;
scanf("%d", &x);

int result = evaluatePolynomial(head, x);

printf("%d\n", result);

return 0;
}
```

**Status :** Correct

**Marks :** 1/1