

## ***DS LAB-APPLICATIONS OF LINKED LIST-2***

### ***Program and output***

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### ***Addition of Two Polynomials-***

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

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

```
#include<math.h>
```

```
struct node{
```

```
    float cf;
```

```
    float px;
```

```
    float py;
```

```
    int flag;
```

```
    struct node *link;
```

```
};
```

```
typedef struct node *NODE;
```

```
NODE getnode()
```

```
{
```

```
    NODE x;
```

```
    x=(NODE)malloc(sizeof(struct node));
```

```
    if(x==NULL)
```

```
{
```

```
    printf("out of memory");  
    exit(0);  
}  
return x;  
}
```

```
NODE insert_rear(float cf,float x,float y,NODE head)
```

```
{  
    NODE temp,cur;  
    int flag;  
    temp=getnode();  
    temp->cf=cf;  
    temp->px=x;  
    temp->py=y;  
    temp->flag=0;  
    cur=head->link;  
    while(cur->link!=head)  
        cur=cur->link;  
    cur->link=temp;  
    temp->link=head;  
    return head;  
}
```

```
NODE read_poly(NODE head){
```

```

int i;

float cf,px,py;

printf("Enter the coefficient as -999 to end the polynomial\n");

for(i=1;;i++){

    printf("enter the %d term\n",i);

    printf("coeff:\n");

    scanf("%f",&cf);

    if(cf== -999)

        break;

    printf("pow x:\n");

    scanf("%f",&px);

    printf("pow y:\n");

    scanf("%f",&py);

    head=insert_rear(cf,px,py,head);

}

return head;

}

void display(NODE head){

    NODE temp;

    if(head->link==head)

    {

        printf("polynomial doesn not exist\n");

        return;

    }

```

```

temp=head->link;
while(temp!=head)
{
    printf("%5.2fx^3.1fy^3.1f\t",temp->cf,temp->px,temp->py);
    temp=temp->link;
}
printf("\n");
}

```

```

NODE add_poly(NODE h1,NODE h2, NODE h3){
    NODE p1,p2;
    int x1,x2,y1,y2,cf1,cf2,cf;
    p1=h1->link;
    while(p1!=h1){
        x1=p1->px;
        y1=p1->py;
        cf1=p1->cf;
        p2=h2->link;
        while(p2!=h2)
        {
            x2=p2->px;
            y2=p2->py;
            cf2=p2->cf;
            if(x1==x2 && y1==y2)

```

```

        break;

        p2=p2->link;

    }

    if(p2!=h2){

        cf=cf1+cf2;

        p2->flag=1;

        if(cf!=0)

            h3=insert_rear(cf,x1,y1,h3);

    }

    else

        h3=insert_rear(cf1,x1,y1,h3);

    p1=p1->link;

}

p2=h2->link;

while(p2!=h2)

{

    if(p2->flag==0)

    {

        h3=insert_rear(p2->cf,p2->px,p2->py,h3);

    }

    p2=p2->link;

}

return h3;

```

```
}  
  
int main()  
{  
    NODE h1,h2,h3;  
  
    h1=getnode();  
    h2=getnode();  
    h3=getnode();  
  
    h1->link=h1;  
    h2->link=h2;  
    h3->link=h3;  
  
    printf("Enter the first polynomial\n");  
    h1=read_poly(h1);  
    printf("Enter the second polynomial\n");  
    h2=read_poly(h2);  
    h3=add_poly(h1,h2,h3);  
    printf("the first polynomial\n");  
    display(h1);  
    printf("the second polynomial\n");  
    display(h2);  
    printf("the sum of the polynomials\n");  
    display(h3);  
    return 0;  
}
```

## Output-

```
Enter the first polynomial
Enter the coefficient as -999 to end the polynomial
enter the 1 term
coeff:
5
pow x:
2
pow y:
1
enter the 2 term
coeff:
4
pow x:
2
pow y:
1
enter the 3 term
coeff:
8
pow x:
5
pow y:
9
enter the 4 term
coeff:
6
pow x:
7
pow y:
4
enter the 5 term
```

```
4
enter the 5 term
coeff:
1
pow x:
8
pow y:
9
enter the 6 term
coeff:
-999
Enter the second polynomial
Enter the coefficient as -999 to end the polynomial
enter the 1 term
coeff:
5
pow x:
8
pow y:
9
enter the 2 term
coeff:
3
pow x:
7
pow y:
4
enter the 3 term
coeff:
5
pow x:
```

```

pow x:
8
pow y:
9
enter the 2 term
coeff:
3
pow x:
7
pow y:
4
enter the 3 term
coeff:
5
pow x:
1
pow y:
0
enter the 4 term
coeff:
-999
the first polynomial
5.00x^2.0y^1.0 4.00x^2.0y^1.0 8.00x^5.0y^9.0 6.00x^7.0y^4.0 1.00x^8.0y^9.0
the second polynomial
5.00x^8.0y^9.0 3.00x^7.0y^4.0 5.00x^1.0y^0.0
the sum of the polynomials
5.00x^2.0y^1.0 4.00x^2.0y^1.0 8.00x^5.0y^9.0 9.00x^7.0y^4.0 6.00x^8.0y^9.0 5.00x^1.0y^0.0

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

```

```

Enter the first polynomial
Enter the coefficient as -999 to end the polynomial
enter the 1 term
coeff:
4
pow x:
5
pow y:
6
enter the 2 term
coeff:
8
pow x:
4
pow y:
1
enter the 3 term
coeff:
-999
Enter the second polynomial
Enter the coefficient as -999 to end the polynomial
enter the 1 term
coeff:
6
pow x:
4
pow y:
1
enter the 2 term
coeff:
2

```



```

coeff:
-999
Enter the second polynomial
Enter the coefficient as -999 to end the polynomial
enter the 1 term
coeff:
6
pow x:
4
pow y:
1
enter the 2 term
coeff:
2
pow x:
9
pow y:
8
enter the 3 term
coeff:
-999
the first polynomial
  4.00x^5.0y^6.0  8.00x^4.0y^1.0
the second polynomial
  6.00x^4.0y^1.0  2.00x^9.0y^8.0
the sum of the polynomials
  4.00x^5.0y^6.0 14.00x^4.0y^1.0  2.00x^9.0y^8.0

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

```

### ***Evaluation Of polynomial-***

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

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

```
#include <math.h>
```

```
struct node
```

```
{
```

```
    float cf;
```

```
    float px;
```

```
    float py;
```

```
    struct node *link;
```

```
};
```

```

typedef struct node *NODE;

NODE getnode()
{
    NODE x;

    x=(NODE)malloc(sizeof(struct node));

    if (x==NULL)
    {
        printf("Memory full\n");
        exit(0);
    }

    return x;
}

NODE insert_rear(float cf,float x,float y,NODE first)
{
    NODE temp,cur;

    temp=getnode();

    temp->cf=cf;

    temp->px=x;

    temp->py=y;

    temp->link=NULL;

    if (first==NULL)
    {
        return temp;
    }
}

```

```

    cur=first;

    while (cur->link!=NULL)
    {
        cur=cur->link;
    }

    cur->link=temp;

    return first;
}

NODE read_poly(NODE first)
{
    int i;

    float cf,px,py;

    printf("Enter -999 to end the polynomial:\n");

    for (i=1;;i++)
    {
        printf("Enter %d term:\n",i);

        printf("Coefficient:\n");

        scanf("%f",&cf);

        if (cf==-999)
        {
            break;
        }

        printf("Power of x:\n");

        scanf("%f",&px);

```

```

        printf("Power of y:\n");

        scanf("%f",&py);

        first=insert_rear(cf,px,py,first);

    }

    return first;

}

float evaluate_polynomial(NODE first)
{
    float x,y,sum=0;

    NODE polynomial;

    printf("Enter the values of x and y:\n");

    scanf("%f%f",&x,&y);

    polynomial=first;

    while (polynomial!=NULL)
    {
        sum=sum+polynomial->cf*pow(x,polynomial->px)*pow(y,polynomial->py);

        polynomial=polynomial->link;

    }

    return sum;

}

void display(NODE first)
{
    NODE temp;

    if (first==NULL)

```

```

        {
            printf("Polynomial does not exist\n");
        }
    else
    {
        temp=first;
        while (temp->link!=NULL)
        {
            printf("(%5.2fx^%3.2fy^%3.2f)\t+",temp->cf,temp->px,temp->py);
            temp=temp->link;
        }
        printf("(%5.2fx^%3.2fy^%3.2f)\n",temp->cf,temp->px,temp->py);
    }
}

int main(){
    NODE first;

    float res;

    first=NULL;

    printf("Enter the polynomial: \n");

    first = read_poly(first);

    res = evaluate_polynomial(first);

    printf("Polynomial is: \n");

    display(first);

    printf("Result is %f\n",res);
}

```

```
    return 0;  
}
```

### ***Output-***

```
Enter the polynomial:  
Enter -999 to end the polynomial:  
Enter 1 term:  
Coefficient:  
7  
Power of x:  
5  
Power of y:  
6  
Enter 2 term:  
Coefficient:  
6  
Power of x:  
2  
Power of y:  
4  
Enter 3 term:  
Coefficient:  
3  
Power of x:  
7  
Power of y:  
9  
Enter 4 term:  
Coefficient:  
5  
Power of x:  
4  
Power of y:  
3  
Enter 5 term:
```

```

Power of x:
7
Power of y:
9
Enter 4 term:
Coefficient:
5
Power of x:
4
Power of y:
3
Enter 5 term:
Coefficient:
2
Power of x:
6
Power of y:
1
Enter 6 term:
Coefficient:
-999
Enter the values of x and y:
5
6
Polynomial is:
( 7.00x^5.00y^6.00)      +( 6.00x^2.00y^4.00)      +( 3.00x^7.00y^9.00)      +( 5.00x^4.00y^3.00)      +( 2.00x^6.00y^1.00)
Result is 2362981744640.000000

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

```

```

Enter the polynomial:
Enter -999 to end the polynomial:
Enter 1 term:
Coefficient:
4
Power of x:
6
Power of y:
2
Enter 2 term:
Coefficient:
7
Power of x:
3
Power of y:
6
Enter 3 term:
Coefficient:
-999
Enter the values of x and y:
2 8
Polynomial is:
( 4.00x^6.00y^2.00)      +( 7.00x^3.00y^6.00)
Result is 14696448.000000

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

```