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EX 3: POLYNOMIAL MANIPULATION


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

struct node
{
    int coef; int
    power; struct
    node*link;
};
typedef struct node NODE;

void create_poly(NODE *list)
{
    int coef;
    int
    power;
    int
    choice;
    NODE *newnode; do{
    newnode=malloc(sizeof(NODE))
    ; printf("Enter the coefficient : ");
    scanf("%d", &coef);

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

    newnode->coef=coef; newnode-
    >power=power; newnode-
    >link=NULL;

    if(list->link==NULL)
    {
        list->link=newnode;
    }
    else
    {
        while(list->link!=NULL)
        { list=list->link;
```

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        }
        list->link=newnode;
    }
    printf("Enter 1 to continue : ");
    scanf("%d", &choice);
    }
    while(choice==1);
}
void add(NODE *list1,NODE *list2,NODE *Result)
{
     NODE *newnode,*temp=Result;
    while(list1!=NULL && list2!=NULL)
 {

    newnode=malloc(sizeof(NODE));
    if(list1->power == list2->power)
    {
      newnode->coef = list1->coef+list2->coef; newnode-
      >power =list1->power; newnode->link=NULL;
      list1=list1->link; list2=list2-
      >link;

    }
    else if(list1->power > list2->power)
    {
      newnode->coef=list1->coef;
      newnode->power=list1->power;
      newnode->link=NULL;
      list1 = list1->link;
    }
    else if(list1->power<list2->power)
    {
        newnode->coef=list2->coef;
        newnode->power=list2->power;
        newnode->link=NULL;
        list2=list2->link;

    }
    temp->link=newnode; temp=temp-
    >link;

 }
```

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   while(list2!=NULL || list2!=NULL)
   {
      newnode = malloc(sizeof(NODE));
      if(list1->link!=NULL)
      {
      newnode->coef=list1->coef;
      newnode->power=list1->power;
      newnode->link= NULL;
      list1=list1->link;
      }
    if(list2->link!= NULL)
    {
      newnode->coef=list2->coef;
      newnode->power=list2->power;
      newnode->link= NULL;
      list2 = list2->link;
      }
      temp->link=newnode; temp=temp-
      >link;
 }
}



void sub(NODE *list1,NODE *list2,NODE *Result)
{
    NODE *newnode,*temp=Result;
    while(list1!=NULL && list2!=NULL)
    {
       newnode=malloc(sizeof(NODE));
       if(list1->power==list2->power)
       {
        newnode->coef=list1->coef-list2->coef;
         newnode->power=list1->power;
         list1=list1->link; list2=list2-
          >link;
       }
      else if(list1->power>list2->power)
      {
       newnode->coef=list1->coef;
       newnode->power=list1->power;
       list1=list1->link;
      }
```

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    else if(list1->power<list2->power)
    {
       newnode->coef= -(list2->coef);
       newnode->power=list2->power;
       list2=list2->link;
    }
    newnode->link= NULL; temp-
    >link=newnode; temp=temp->link;
    }

    while(list1!=NULL || list2!= NULL)
    {
    newnode = malloc(sizeof(NODE));
    if(list1!= NULL)
    {
      newnode->coef=list1->coef;
      newnode->power=list1->power;
      list1 = list1->link;
    }
    if(list2 != NULL)
    {
      newnode->coef= -(list2->coef);
      newnode->power=list2->power;
      list2 = list2->link;
    }
    newnode->link= NULL; temp-
    >link=newnode; temp=temp->link;
  }
}

void multi(NODE *list1, NODE *list2, NODE *Result)
{
    NODE *newnode;
    NODE *t1=list1->link;
    NODE *t2=list2->link;
    NODE *t3=Result;

    while(t1!=NULL)
    { t2=list2->link;
       while(t2!=NULL
       )
       {
```

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            newnode=(NODE*)malloc(sizeof(NODE)); t3-
            >link=newnode; newnode->coef=t1->coef*t2->coef;
            newnode->power=t1->power+t2->power; t2=t2->link;
            newnode->link=NULL; t3=t3-
            >link;
        } t1=t1-
        >link;
    }
}

void display(NODE *list)
{
    NODE *temp=list->link;
    while(temp!=NULL)
    {
      printf("%dX^%d",temp->coef,temp->power);
       temp=temp->link;
       if(temp != NULL && temp->coef >= 0)
        {
          printf("+")
          ;
        }
    }
}

int main(){
    int t=1,choice;
    NODE *Poly1 = malloc(sizeof(NODE));
     NODE *Poly2 = malloc(sizeof(NODE));
     NODE *Result = malloc(sizeof(NODE));
    while (t==1){
       Poly1->link=NULL; Poly2->link=NULL; printf("\n\n\nMENU\n");
       printf("1.Add the polynomials\n2.Subtract the polynomials\n3.Multiply
       the
polynomials\n4.EXIT\n");
       printf("\nEnter your
       choice:");
       scanf("%d",&choice); if
       (choice!=4){
          printf("Enter the values for first polynomial :\n");
          create_poly(Poly1); printf("The polynomial equation
          is : "); display(Poly1); printf("\nEnter the values for
          second polynomial :\n"); create_poly(Poly2);
```

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        printf("The polynomial equation is : ");
        display(Poly2);
    }
    switch (choice)
    {
        case 1:
        add(Poly1, Poly2, Result); printf("\nThe polynomial
        equation addition result is : "); display(Result->link);
        break; case 2:
        sub(Poly1, Poly2, Result);
        printf("\nThe polynomial equation addition result is :
        "); display(Result->link); break; case 3:
        multi(Poly1, Poly2, Result);
        printf("\nThe polynomial equation addition result is :
        "); display(Result); break; case 4:
        t=0;
        break;
    }
  }
}
```