

Program

```
#include <stdio.h>

struct poly {
    float coeff;
    int exp;
};

struct poly p1[10], p2[10], p3[20];

int readpoly(struct poly p[]) {
    int t, i;
    printf("Enter number of terms in the polynomial: ");
    scanf("%d", &t);
    for (i = 0; i < t; i++) {
        printf("Enter coefficient of term %d: ", i + 1);
        scanf("%f", &p[i].coeff);
        printf("Enter the exponent of the term %d: ", i + 1);
        scanf("%d", &p[i].exp);
    }
    printf("\n");
    return t;
}

int addpoly(struct poly p1[], struct poly p2[], struct poly p3[], int t1, int t2) {
    int i = 0, j = 0, k = 0;

    while (i < t1 && j < t2) {
        if (p1[i].exp == p2[j].exp) {
            p3[k].coeff = p1[i].coeff + p2[j].coeff;
            p3[k].exp = p1[i].exp;
            i++;
            j++;
        } else if (p1[i].exp > p2[j].exp) {
            p3[k] = p1[i];
            i++;
        } else {
            p3[k] = p2[j];
            j++;
        }
        k++;
    }

    while (i < t1) {
        p3[k++] = p1[i++];
    }

    while (j < t2) {
        p3[k++] = p2[j++];
    }

    return k;
}

void displaypoly(struct poly p[], int t) {
    for (int k = 0; k < t; k++) {
        printf("%.2f(x^%d)", p[k].coeff, p[k].exp);
        if (k < t - 1) {
            printf(" + ");
        }
    }
}
```

POLYNOMIAL ADDITION

Aim:

To read two polynomials and store them in an array. Calculate the sum of the two polynomials.

Algorithm:

1. Start
2. Create a structure poly (float coeff, int exp)
3. Create array of structure p1[10], p2[10], p3[10]
4. Define function int readpoly (structure poly p[])
5. Read number of terms in the polynomial - t1
6. Begin for loop from i=0 to t1
 read coefficients and exponents
 return t1
7. Define function addpoly (structure poly p1[10], structure poly p2[10], structure poly p3[10], int t1, int t2)
8. Initialize i, j, k to 0
9. Begin while loop:

```

i < t1 & j < t2
if ( p1[i].exp == p2[j].exp )
    p3[k].coeff = p1[i].coeff + p2[j].coeff
    p3[k].exp = p1[i].exp
    i++, j++, k++
else if ( p1[i].exp > p2[j].exp )
    p3[k].coeff = p1[i].coeff
    p3[k].exp = p1[i].exp
    i++, k++
else p3[k].coeff = p2[j].coeff
    p3[k].exp = p2[j].exp
    j++, k++

```

10. Begin while loop : i < t1

```

p3[k].coeff = p1[i].coeff
p3[k].exp = p1[i].exp
i++, k++

```

```

    printf("\n");
}

int main() {
    int t1, t2, t3;

    printf("Polynomial 1\n");
    t1 = readpoly(p1);
    printf("Polynomial 1: ");
    displaypoly(p1, t1);

    printf("Polynomial 2\n");
    t2 = readpoly(p2);
    printf("Polynomial 2: ");
    displaypoly(p2, t2);

    printf("\nAdded polynomial:\n");
    t3 = addpoly(p1, p2, p3, t1, t2);

    displaypoly(p3, t3);

    return 0;
}

```

Output

```

gcc PolynomialAddition.c
./a.out
Polynomial 1
Enter number of terms in the polynomial: 4
Enter coefficient of term 1: 6
Enter the exponent of the term 1: 8
Enter coefficient of term 2: 3
Enter the exponent of the term 2: 3
Enter coefficient of term 3: 2
Enter the exponent of the term 3: 2
Enter coefficient of term 4: 5
Enter the exponent of the term 4: 0

Polynomial 1: 6.00(x^8) + 3.00(x^3) + 2.00(x^2) + 5.00(x^0)
Polynomial 2
Enter number of terms in the polynomial: 3
Enter coefficient of term 1: 5
Enter the exponent of the term 1: 10
Enter coefficient of term 2: 3
Enter the exponent of the term 2: 8
Enter coefficient of term 3: 4
Enter the exponent of the term 3: 3

Polynomial 2: 5.00(x^10) + 3.00(x^8) + 4.00(x^3)

Added polynomial:
5.00(x^10) + 9.00(x^8) + 7.00(x^3) + 2.00(x^2) + 5.00(x^0)

```

11. Begin while loop : $j < t_2$

```
p3[k].coeff = p2[i].coeff  
p3[k].exp = p2[i].exp  
j++, k++
```

12. Define function displaypoly (structure poly p[], int t)
Begin for loop from $k = 0$ to $t-1$
display polynomial

13. In main ()

```
Call readpoly(p1)  
Call displaypoly(p1, t1)  
Call readpoly(p2)  
Call displaypoly(p2, t2)  
Call addpoly(p1, p2, p3, t1, t2)  
Call displaypoly(p3, t3)
```

14. Stop

Result:

Program has been executed successfully and obtained the output