# Assignment 5.2 (Home Assignment)

## 1.Write a program to add two polynomials.

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#include <stdio.h>
#include <stdlib.h>
struct Term {
   int coeff;
   int exp;
};
void inputPolynomial(struct Term* poly, int n) {
   int i;
   for (i = 0; i < n; i++) {
      printf("Enter coefficient for term %d: ", i + 1);
      scanf("%d", &poly[i].coeff);
      printf("Enter exponent for term %d: ", i + 1);
      scanf("%d", &poly[i].exp);
   }
}
void printPolynomial(struct Term* poly, int n) {
   int i;
   for (i = 0; i < n; i++) {
      printf("%dx^%d", poly[i].coeff, poly[i].exp);
      if (i != n - 1)
         printf(" + ");
   }
   printf("\n");
}
struct Term* addPolynomials(struct Term* poly1, int n1, struct Term* poly2, int n2, int* n3) {
   int i = 0, j = 0, k = 0;
   struct Term* result = (struct Term*)malloc((n1 + n2) * sizeof(struct Term));
   if (result == NULL) {
      printf("Memory allocation failed\n");
      exit(1);
```

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    }

    while (i < n1 && j < n2) {
        if (poly1[i].exp > poly2[j].exp) {
            result[k++] = poly1[i++];
        } else if (poly1[i].exp < poly2[j].exp) {
            result[k++] = poly2[j++];
        } else {
            result[k].exp = poly1[i].exp;
            result[k].coeff = poly1[i].coeff + poly2[j].coeff;
            i++; j++; k++;
        }
    }
    while (i < n1) {
        result[k++] = poly1[i++];
    }
    while (j < n2) {
        result[k++] = poly2[j++];
    }
    *n3 = k;
    return result;
}
int main() {
    int n1, n2, n3;
    struct Term *poly1, *poly2, *sum;

    printf("Enter number of terms for first polynomial: ");
    scanf("%d", &n1);
    poly1 = (struct Term*)malloc(n1 * sizeof(struct Term));
    if (poly1 == NULL) {
        printf("Memory allocation failed\n");
        return 1;
    }
```

```
    printf("Enter terms for first polynomial in descending order of exponents:\n");
    inputPolynomial(poly1, n1);

    printf("Enter number of terms for second polynomial: ");
    scanf("%d", &n2);
    poly2 = (struct Term*)malloc(n2 * sizeof(struct Term));
    if (poly2 == NULL) {
        free(poly1);
        printf("Memory allocation failed\n");
        return 1;
    }

    printf("Enter terms for second polynomial in descending order of exponents:\n");
    inputPolynomial(poly2, n2);

    sum = addPolynomials(poly1, n1, poly2, n2, &n3);

    printf("First polynomial: ");
    printPolynomial(poly1, n1);
    printf("Second polynomial: ");
    printPolynomial(poly2, n2);
    printf("Sum polynomial: ");
    printPolynomial(sum, n3);

    free(poly1);
    free(poly2);
    free(sum);

    return 0;
}
```