Assignment Number: 5

Problem statement:

Polynomial operations: Write a menu driven C++ program with class for single variable polynomial and write functions to perform following polynomial operations using arrays
1. Read polynomial
2. Display polynomial
3. Add two polynomials

You can try above polynomial operation using Linked list

Objectives:

Understand the use of array of structure in implementing polynomials

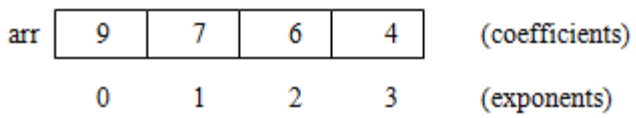
Theory:

A polynomial is an expression consisting of variables (or indeterminates) and coefficients For example of polynomial is

$$P(x) = 4x^3+6x^2+7x+9$$

A polynomial may be represented using arrays or linked lists.

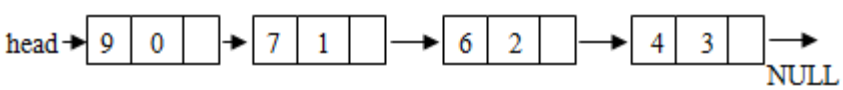
Array representation assumes that the exponents of the given expression are arranged from 0 to the highest value (degree), which is represented by the subscript of the array beginning with 0. The coefficients of the respective exponent are placed at an appropriate index in the array. The array representation for the above polynomial expression is given below:



A polynomial may also be represented using a linked list. A structure may be defined such that it contains two parts- one is the coefficient and second is the corresponding exponent. The structure definition may be given as shown below:

```
struct polynomial
{
int coefficient;
int exponent;
struct polynomial *next;
};
```

Thus the above polynomial may be represented using linked list as shown below:



Algorithm:

For polynomial Addition:

Step 1: Start

Step 2: Declare structure polynomial

Step 3: Read number of terms of the first polynomial (N) and second polynomial (M)

Step 4: Read coefficient and exponent of both polynomial(P1 and P2)

Step 5: while(i<N)&&(j<M), repeat steps 14 to 17

Step 6: if P1[i].expo>P2[j].expo
P3[k]=P[i];
Increment k and i

Step 7: if P1[i].expo<P2[j].expo
P3[k]=P[j];
Increment k and j

Step 8: if P1[i].expo=P2[j].expo
P3[k].coeff=P[i].coeff+ P[j].coeff;
P3[k].expo=P[i]. expo
Increment i,k and j

Step 9: for(i<N)
P3[k]=P[i];
Increment k and i

Step 10: for(i<M)
P3[k]=P[j];
Increment k and j

Step 11: Display resultant polynomial
Step 12: Stop

Time Complexity:
Discuss time complexity of following functions

read, display, evaluate, addition

Conclusion: Thus we have successfully implemented polynomial using of structures

Practice problem:
Write code / algorithm of polynomial multiplication