**Lab Task:**

**DSA**

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**BSCS10-C**

Addition of two polynomials. Consider addition of the following polynomials,

A picture containing text, sky, antenna, orange

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The resulting polynomial is going to be,



Now notice how the addition was carried out. Let us say the result of addition is going to be stored in a third list.

\_ we start with the highest power in any polynomial.

\_ if there is no item having the same exponent, we simply append the term to the new list, and continue with the process.

\_ if we found that the exponents are matching, we simply add the coefficients and then store the term in the new list.

\_ If one list gets exhausted earlier and the other list still contains some lower order terms, then simply append the remaining terms to the new list.

Execute the completed code, and the output should be something similar one in Figure 2.

**Code:**

|  |
| --- |
| #include<iostream>  using namespace std;  class Node {  public:  int coff;  int exp;  Node\* next = NULL;  };  class linkedList {  private:  int size;  Node\* head = NULL;  Node\* tail = NULL;    public:  linkedList() {  //Basic Constructor to Initialize the Linked list  this->size = 0;  }  void addNode(int cof, int expo) {  //adding nodes to linked list      Node\* newNode = new Node;  newNode->coff = cof;  newNode->exp = expo;  //Adding coefficient and exponents  if (this->head == NULL) {  //if there is nothing in head keep on adding on head  this->head = newNode;  this->tail = this->head;  }    else {  //else add it on tail side  this->tail->next = newNode;  this->tail = newNode;  }  this->size++;  //increase the size of linked list  }  void displayList() {  //Displaying the List  Node\* temp = this->head;    while (temp != NULL) {  //Printing the linked list  cout << temp->coff << "x^" << temp->exp << " ";  temp = temp->next;  }  }  Node\* getHead() {  //getter of head  return this->head;  }  Node\* getTail() {  //getter of tail  return this->tail;  }  };  //Function to add Polynomials  linkedList\* polyAddition(linkedList\* list1, linkedList\* list2) {  linkedList\* resultAdd = new linkedList;  Node\* temp1 = new Node;  Node\* temp2 = new Node;  temp1 = list1->getHead();//Getting the head of list 1  temp2 = list2->getHead();//getting the head of list 2  while (temp1 != NULL && temp2 != NULL) {    if (temp1->exp == temp2->exp) {  //If the exponents are same add their coefficients  resultAdd->addNode(temp1->coff + temp2->coff, temp1->exp);  temp1 = temp1->next;  temp2 = temp2->next;  }  //Else    else if (temp1->exp > temp2->exp) {  resultAdd->addNode(temp1->coff, temp1->exp);  temp1 = temp1->next;  }      else if (temp1->exp < temp2->exp) {  resultAdd->addNode(temp2->coff, temp2->exp);  temp2 = temp2->next;  }  }  while (temp1 != NULL) {  resultAdd->addNode(temp1->coff, temp1->exp);  temp1 = temp1->next;  }    while (temp2 != NULL) {  resultAdd->addNode(temp2->coff, temp2->exp);  temp2 = temp2->next;  }  return resultAdd;  //Returning the Added result  }  int main() {  int coff = 0,flag=0, exp = 0;  linkedList\* list1 = new linkedList();  linkedList\* list2 = new linkedList();  //Taking the input for list 1  cout << "Enter the input for polynomial 1" << endl;  cout << endl;  cout << "Enter the coefficient for polynomial 1: " << endl;  cin >> coff;  cout << "Enter the exp for polynomial 1: " << endl;  cin >> exp;  list1->addNode(coff, exp);  cout << "Enter 1 to add more polynomial or press 0 to end addition" << endl;  cin >> flag;  while (flag != 0) {  cout << "Enter the coefficient for polynomial 1: " << endl;  cin >> coff;  cout << "Enter the exp for polynomial 1: " << endl;  cin >> exp;  list1->addNode(coff, exp);  cout << "Enter 1 to add more polynomial or press 0 to end addition" << endl;  cin >> flag;  }  cout << endl;  cout << "First Polynomial is : " << endl;  list1->displayList();  cout << endl;  cout << endl;  cout << "Enter the input for polynomial 2" << endl;  cout << "Enter the coefficient for polynomial 2: " << endl;  cin >> coff;  cout << "Enter the exp for polynomial 2: " << endl;  cin >> exp;  list2->addNode(coff, exp);  cout << "Enter 1 to add more polynomial or press 0 to end addition" << endl;  cin >> flag;  while (flag != 0) {  cout << "Enter the coefficient for polynomial 2: " << endl;  cin >> coff;  cout << "Enter the exp for polynomial 2: " << endl;  cin >> exp;  list2->addNode(coff, exp);  cout << "Enter 1 to add more polynomial or press 0 to end addition" << endl;  cin >> flag;  }  cout << endl;  cout << "Second Polynomial is : " << endl;  list2->displayList();  cout << endl;  cout << "The addition of the two polynomials has following result:" << endl;      linkedList\* addResult = polyAddition(list1, list2);  cout << endl;  addResult->displayList();  return 0;  } |

**Output:**

Text

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