**Name of Student :- Pavan Ratan Gole**

**UID:- Na**

**Batch:- C4**

**Exp. No. 3**

**Aim:-** Implement Polynomial Expression execution using Singly Linked List
P1(X)=3*X^4+12* x^2+10
P2(x)=5X^3-4*x^2+3
1- Create a Linked Representation of Polynomial Expressions. Display the same
2-Perform arithmetic operations on the given expressions. Shoe the linked representation of the resulting polynomial expression.

**Program:-**

```
class Node {
   private  Node head = null;
   int coefficient;
   int power;
   Node next = null;

   Node(int coefficient,int power) {
       this.coefficient = coefficient;
       this.power = power;
       this.head = this;
   }

   Node createNode(int coefficient, int power) {
       head = this;
       Node node = new Node(coefficient,power);
       if(head == null) {
           head = node;
       }
       Node temp = head;
       while(temp.next != null) {
           temp = temp.next;
       }
```

```
        temp.next = node;
        return head;

    }

    static void display(Node node) {
        while(node != null) {
            if(node.next != null)
                System.out.print( "" + node.coefficient + "x^" + node.power
+ "+" );
            else
            System.out.print( "" + node.coefficient + "x^" + node.power  );
            node = node.next;
        }
    }
}

/**
* Polynomial
*/
public class Polynomial {
    public static void main(String[] args) {
        //Creating Frist Polynomial
        Node poly1 = new Node(3,4);
        poly1.createNode(12, 2);
        poly1.createNode(10, 0);
        System.out.println("Displaying Polynomial 1");
        Node.display(poly1);
        System.out.println();
        System.out.println();

        //Creating Second Polynomial
        Node poly2 = new Node(5, 3);
        poly2.createNode(4, 2);
        poly2.createNode(3, 0);
        System.out.println("Displaying Polynomial 2");
        Node.display(poly2);
        System.out.println();
        System.out.println();
```

```
        // Arithmetic of two Polynomial
        Node arithmetic = arithmetic(poly1, poly2);
        System.out.println("Arithmetic of two polynomial");
        System.out.println();
        Node.display(arithmetic);
        System.out.println();


    }

    static Node  arithmetic(Node p1, Node p2) {
        Node poly3 = null;
        Node curp1 = p1;
        Node curp2 = p2;
        while(curp1 != null && curp2 != null) {
            if(curp1.power > curp2.power) {
                if(poly3 == null) {
                    poly3 = new Node(curp1.coefficient, curp1.power);

                }
                else {
                    poly3.createNode(curp1.coefficient, curp1.power);
                }
                curp1 = curp1.next;
            }
            else if(curp1.power < curp2.power) {
                if(poly3 == null) {
                    poly3 = new Node(curp2.coefficient, curp2.power);

                }
                else {
                    poly3.createNode(curp2.coefficient, curp2.power);
                }
                curp2 = curp2.next;
            }
            else {
                if(poly3 == null) {
                    poly3 = new Node(curp2.coefficient + curp1.coefficient,
curp2.power);
```

```
                }
                else {
                    poly3.createNode(curp2.coefficient + curp1.coefficient,
curp2.power);
                }
                curp2 = curp2.next;
                curp1 = curp1.next;
            }
        }

        return poly3;
    }
}
```

**Output:-**

```
Displaying Polynomial 1
3x^4+12x^2+10x^0

Displaying Polynomial 2
5x^3+4x^2+3x^0
```

**Stored the polynomial in linked list.**

```
Arithmetic of two polynomial

3x^4+5x^3+16x^2+13x^0
```

**Performed the arithmetic of two polynomials and stored it in another linked list.**