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class Node:
    def __init__(self, coeff, exp):
        self.coefficient = coeff
        self.exponent = exp
        self.next = None

class Polynomial:
    def __init__(self):
        self.head = None

    def insert(self, coeff, exp):
        new_node = Node(coeff, exp)
        if self.head is None:
            self.head = new_node
        else:
            current = self.head
            while current.next:
                current = current.next
            current.next = new_node

    def display(self):
        current = self.head
        while current:
            print(f"{current.coefficient}x^{current.exponent}", end=" ")
            if current.next:
                print("+", end=" ")
            current = current.next
        print()

    def add(self, other):
        result = Polynomial()
        current_self = self.head
        current_other = other.head

        while current_self and current_other:
            if current_self.exponent > current_other.exponent:
                result.insert(current_self.coefficient, current_self.exponent)
                current_self = current_self.next
            elif current_self.exponent < current_other.exponent:
                result.insert(current_other.coefficient, current_other.exponent)
                current_other = current_other.next
            else:

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    result.insert(current_self.coefficient + current_other.coefficient, current_self.exponent)
    current_self = current_self.next
    current_other = current_other.next
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while current_self:
    result.insert(current_self.coefficient, current_self.exponent)
    current_self = current_self.next
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while current_other:
    result.insert(current_other.coefficient, current_other.exponent)
    current_other = current_other.next
```

```
return result
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def multiply(self, other):
    result = Polynomial()
    current_self = self.head
    while current_self:
        current_other = other.head
        while current_other:
            coeff = current_self.coefficient * current_other.coefficient
            exp = current_self.exponent + current_other.exponent
            result.insert(coeff, exp)
            current_other = current_other.next
        current_self = current_self.next
    return result
```

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# Menu
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def menu():
    print("1. Insert Polynomial")
    print("2. Display Polynomial")
    print("3. Add Polynomials")
    print("4. Multiply Polynomials")
    print("5. Exit")
    choice = int(input("Enter your choice: "))
    return choice
```

```
poly1 = Polynomial()
poly2 = Polynomial()
```

```
while True:
    choice = menu()
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```
if choice == 1:
    coeff = int(input("Enter coefficient: "))
    exp = int(input("Enter exponent: "))
    poly_choice = int(input("Enter 1 for first polynomial, 2 for second polynomial: "))
    if poly_choice == 1:
        poly1.insert(coeff, exp)
    elif poly_choice == 2:
        poly2.insert(coeff, exp)
    else:
        print("Invalid choice")

elif choice == 2:
    print("Polynomial 1:")
    poly1.display()
    print("Polynomial 2:")
    poly2.display()

elif choice == 3:
    print("Result of addition:")
    result = poly1.add(poly2)
    result.display()

elif choice == 4:
    print("Result of multiplication:")
    result = poly1.multiply(poly2)
    result.display()

elif choice == 5:
    print("Exiting...")
    break

else:
    print("Invalid choice. Please enter a valid option.")
```