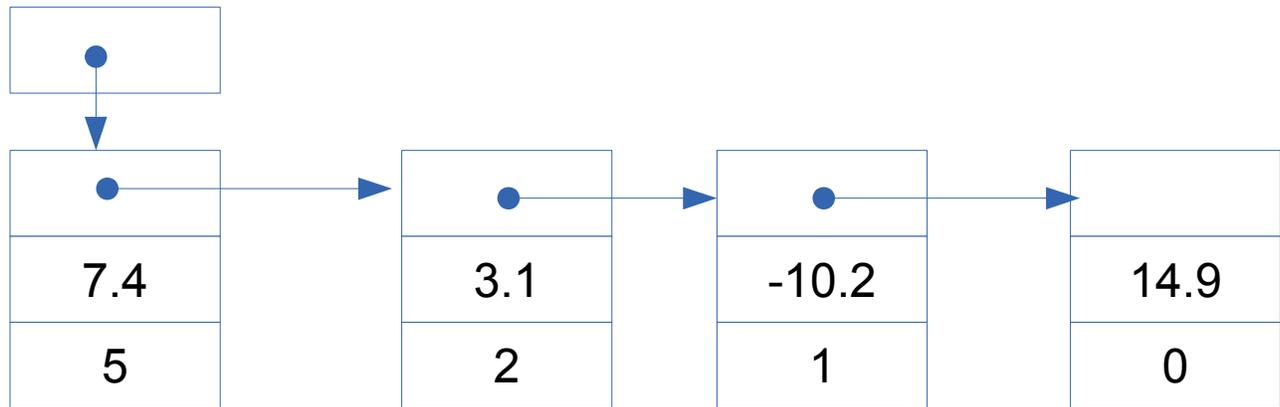


Programming Project

A polynomial such as:

$$f(x) = 7.4x^5 + 3.1x^2 - 10.2x + 14.9$$

can be represented as a linked list in which every node corresponds to a term in the polynomial. Each term's coefficient and degree are stored as fields in the corresponding node. The polynomial above, for example, can be represented by a list:



We assume that there is at most one element for any given degree and that the elements are ordered so that the highest degree comes first.

Implement a class, `Polynomial`, that describes such a polynomial. It must supply the following methods:

A constructor that builds a polynomial with no terms.

A method to parse a string into a polynomial. The string is a series of number pairs. The first item in each pair is the coefficient, and the second is the degree. The elements of the pair are comma-separated. The pairs are separated by one or more blanks. To input the polynomial above, the input string would be "7.4,5 3.1,2 -10.2,1 14.9,0"

A method to evaluate a polynomial (calculate its value) for a given value of x .

A method to return a string representation of the polynomial, for example:

$$7.4 * X ^ 5 + 3.1 * X ^ 2 - 10.2 * X + 14.9$$

A method to find the derivative of a polynomial.

A method to find the sum of two polynomials.

Hint: You will want to create a class that represents a term.

Write a JUnit test class to test the methods of Polynomial.

Write a console user interface that provides a simple menu system for interacting with the Polynomial class. (Omit the "sum" function).

Polynomial Driver

1. Enter a polynomial.
2. Evaluate the polynomial.
3. Find the derivative.
4. Display the polynomial.

?

1

Enter the terms of the polynomial:

2,4 7,1 -3,0

1. Enter a polynomial.
2. Evaluate the polynomial.
3. Find the derivative.
4. Display the polynomial.

?

2

Enter the value of x:

2

The polynomial value is 43.

1. Enter a polynomial.
2. Evaluate the polynomial.
3. Find the derivative.
4. Display the polynomial.

?

4

$2 * X^4 + 7 * X - 3$

1. Enter a polynomial.
2. Evaluate the polynomial.
3. Find the derivative.
4. Display the polynomial.

?

3

$8 * X^3 + 7$

1. Enter a polynomial.
2. Evaluate the polynomial.
3. Find the derivative.
4. Display the polynomial.

?