A *polynomial of degree n* has the form

$$a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$$

where $a_0, a_1, \ldots, a_n$ are numeric constants called the *coefficients* of the polynomial and $a_n \neq 0$. For example,

$$1 + 3x - 7x^3 + 5x^4$$

is a polynomial of degree 4 with integer coefficients 1, 3, 0, –7, and 5. One common implementation of a polynomial stores the degree of the polynomial and the list of coefficients. This is the implementation to be used in the exercises that follow. As you add the various operations to the `Polynomial` class you are building, you should also write a program to test your class, as instructed in Programming Problem 1 at the end of this chapter.

1. Write a declaration for a `Polynomial` class whose data members are an integer for the degree and an array for the list of coefficients and with basic operations of input and output.
2. Implement the input operation in Exercise 1.
3. Implement the output operation in Exercise 1. Display the polynomial in the usual mathematical format with x^n displayed as `x^n`.
4. Add an evaluate operation to your `Polynomial` class that allows the user to enter a value for x and that calculates the value of the polynomial for that value.
5. Add an addition operation to your `Polynomial` class.
6. Add a multiplication operation to your `Polynomial` class.