**Practice 7**

1. **Assign grades** Write a program that reads student scores, gets the best score, and then assigns grades based on the following scheme:

   Grade is A if score is ≥ best - 5;
   Grade is B if score is ≥ best - 10;
   Grade is C if score is ≥ best - 15;
   Grade is D if score is ≥ best - 20;
   Grade is F otherwise.

   The program prompts the user to enter the total number of students and then prompts the user to enter all of the scores, and concludes by displaying the grades. Here is a sample run:

```
Enter the number of students: 4
Enter 4 scores: 40 55 70 58
Student 0 score is 40 and grade is F
Student 1 score is 55 and grade is C
Student 2 score is 70 and grade is A
Student 3 score is 58 and grade is C
```

2. **Count occurrences of numbers** Write a program that reads integers between 1 and 50 and counts the occurrences of each. Assume the input ends with 0. Here is a sample run of the program:

```
Enter integers between 1 and 50: 2 5 6 5 4 3 23 43 2 0
2 occurs 2 times
3 occurs 1 time
4 occurs 1 time
5 occurs 2 times
6 occurs 1 time
23 occurs 1 time
43 occurs 1 time
```

3. **Standard deviation** Write a program that computes the standard deviation of numbers. The mean and standard deviation can be calculated using the following formulae:

$$\text{mean} = \frac{\sum_{i=1}^{n} x_i}{n} = \frac{x_1 + x_2 + \cdots + x_n}{n} \quad \text{deviation} = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \text{mean})^2}{n - 1}}$$

   Your program should contain the following methods:

```
/** Compute the deviation of double values **/
public static double deviation(double[] x)
```

```
/** Compute the mean of double values **/
public static double mean(double[] x)
```

Write a test program that prompts the user to enter 10 numbers and displays the mean and standard deviation, as presented in the following sample run:

```
Enter 10 numbers: 1.9 2.5 3.7 2 1 6 3 4 5 2
The mean is 3.11
The standard deviation is 1.55738
```

4. **Check if sorted** An array `list` is required to be sorted in ascending order. Write a method that returns `true` if `list` is sorted, using the following header:

   ```
   public static boolean isSorted(int[] list)
   ```

   Write a test program that prompts the user to enter the number of integers in the list and then prompts the user to enter that many integers.

```
Enter the number of integers: 5
Enter list of integers: 2 5 6 9 10
The list is sorted
```

```
Enter the number of integers: 5
Enter list of integers: 2 5 6 1 6
The list is not sorted
```