

## Chapter 8 Laboratory Exercise

### Prelab Assignment

1. Write Java code statements that accomplish the tasks listed below.
  - a. Declare an array of integers.
  - b. Allocate storage to allow 5 integers to be stored in the array.
  - c. Populate the array with the values: 1, 8, 27, 64, 125
  - d. Replace the third array element with the value -7
  - e. Copy the value of the fifth array element to the first array storage location.
  - f. Subtract the value stored in the second array storage location from the value stored in the third and store the difference in the fourth array storage location.
  - g. Compute the sum of the array elements with subscripts 1 to 3.

2. Write Java code to reverse the contents stored in a ten-element array of doubles (e.g.  $A[9] \rightarrow A[0]$ ,  $A[8] \rightarrow A[1]$ , etc.). Do not use a second array in your solution.

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1. Computing the median of a set of values involves first sorting the values into either ascending or descending order. If the number of values is odd, then the median is the middle value. If the number of values is even, the median is the average of the two middle values. Write and test a Java program that reads in a set of values from the user and makes use of either `selectionSort` or `insertionSort` to compute the median of the values.

2. Write a Java program that simulates the 100 rolls of a pair of dice. Each die has six faces numbered 1 to 6. Determine the frequency distribution of the sum of the two die values on each roll. A frequency distribution is an array contains each sum value and a count of the number of times the sum occurred. The Java Math class contains a function `random( )` that returns a pseudorandom number between 0.0 and 1.0. The expression `rint(6 * random( )) + 1` will return a pseudorandom value between 1 and 6.

3. Assume you want to be able to read, display, and add integer values with up to 30 digits each together. To accomplish this you decide to store the integers in element arrays where each digit is stored in its own store location. Write and test a Java class containing the necessary methods. You need to be aware that it is possible to add two 30-digit numbers together and obtain a 31-digit answer (this is called overflow). Your program should print an error message if this occurs).

4. Write and test a Java class that uses an array of DirectoryEntry objects to store telephone directory information for a small company. There will never be more than 100 entries in the directory. Each directory entry will contain a name, phone number, and office number. Your class should provide methods for populating the array by prompting the user to the required information, allow the user to search for phone numbers by name or office number, and provide a means of printing the entire array.

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### Postlab Questions

1. What methods should be added the class you developed for exercise 4 to allow the phone directory to be updated over time?
2. What provisions should be made to prevent entering bad data into the telephone directory from exercise 4?
3. How hard would it be to add methods for multiplying two 30-digit integers to the class you developed in exercise 3?
4. Did it matter whether you used insertion sort or selection sort in your median computation program?