

## Chapter 4 Laboratory Exercise

### Prelab Assignment

1. Devise an algorithm for sorting (ordering) 3 cards, each of which contains a single digit numeric value.
2. How would you extend your algorithm to sort 6 cards containing numeric values?
3. How would your algorithm need to be changed if the cards contained names (strings) instead of numeric values?

## Chapter 4 Laboratory Exercise

1. Write Java application that contains an if-else statement that prints a message that indicates whether a real number (double) entered by a user is positive or negative. Test your program using several input values and draw a flowchart for your program.

2. Write a Java application containing a nested-if statement that indicates whether the product of two doubles (x and y) entered by a user will be positive or negative, without actually multiplying the numbers together. Test your program using several pairs of values. Draw a flowchart for your program.

3. Write Java application that implements the algorithm below and test it for several scores:

```
prompt "Enter your test score (0-10) : "  
read score
```

```
if (score >= 9)  
    grade = "A"  
else if (score >= 8)  
    grade = "B"  
else if (score >= 7)  
    grade = "C"  
else if (score >= 6)  
    grade = "D"  
else  
    grade = "E"
```

4. Rewrite the nested-if statement from your program from the previous exercise using the < operator in place of >=. Reorder the statements so that your new program produces the same output for your test scores as your original program.
  
5. Rewrite your program from exercise 3 using a switch statement in place of a nested-if statement. Test your new program using your original test values.

6. Write a program that displays water bills. Your program should prompt the user to enter an integer account number, a character use code, and a real number representing the gallons of water used. The output from your program should include the account number, message indicating the type of usage, and the amount of money due from the user. Draw a flowchart for your program.

The water rates vary depending on the type of usage. A code of H means home use, a code of C means commercial use, and a code of I means industrial use. Any other code value should be treated as an error. Water rates are computed as follows:

Code H:       \$5.00 plus \$0.005 per gallon

Code C:       \$1000.00 for the first 4 million gallons used plus  
              \$0.025 for each additional gallon used

Code I:       \$1000.00 if usage does not exceed 4 million gallons  
              \$2000.00 if usage is between 4 million and 10 million gallons  
              \$3000.00 if 10 million gallons or more

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### Postlab Questions

1. What was the most difficult part of this lab?
2. How would you test the product of two doubles to see if it was negative without actually multiplying them?
3. How would you prevent a run-time error from occurring when executing the switch statement you wrote in exercise 5 if the user enters a score less than 0 or greater than 10?
4. What would you have to do to use a switch statement to compute letter grades if the scores ranged in value from 0 to 100, instead of from 0 to 10 (in Exercise 5)? Can you think of some way to avoid listing 101 separate case labels?