Chapter 9 Laboratory Exercise

Prelab Assignment

1. Can class methods access instance variables? Why or why not?

2. Can instance methods access class variables? Why or why not?

3. How can overloaded methods be created?

4. Why would you want to make use of a Java interface in a program?

5. What is the difference between top-down design and stepwise refinement?

6. Write a class method that determines whether an integer is divisible by 3 or not. A number is divisible by 3 if the sum of its digits is divisible by 3.

Chapter 9 Laboratory Exercise

1. Implement a Java class library implemented using class methods to test an integer argument for the following properties:

   a. Is it divisible by 5?
   b. Is the sum of its digits even?
   c. Is the number “perfect” (e.g. its value equals the sum of its factors)?
   d. Is the number prime?

2. Devise and test a Java program that encodes and decodes or message typed by the user. The message must end in a period and consists of only spaces and letters. The code should be based on a simple shift of the normal alphabet by two letter positions (e.g. a=c, b=d, c=f, … , y=a, z=b).

3. Generalize your program from Exercise 2 so that your class implements an interface instead. Use your interface in a program that allows the user to translate a message to and from an arbitrary substitution code entered by the user (e.g. the user provides any permutation of letters he or she wishes for the code).

Chapter 9 Laboratory Exercise

Postlab Questions

1. Were the methods implemented in Exercise 1 good choices for inclusion in a class library?

2. Could the graphics functions from Chapter 8 be collected in a class library implemented using class methods?

3. Would it have been better to design your solution for Exercise 2 using an interface in the first place?

4. How could you use the Java random number generator to create a code for the user in Exercise 3?