HST 952 Homework 2

1. rot13 is a simple encryption method that rotates the alphabet by 13 characters (so, for example, 'a' becomes 'n', 'b' becomes 'o', and 'c' becomes 'p', etc.). It is used in some usenet newsgroups (such as rec.humor.funny) to encrypt messages that might be deemed offensive. There are other variations on this simple encryption scheme such as rot10 (rotate by 10 characters) and rot19 (rotate by 19 characters).

   a) Write out encrypted versions of the following sentence using rot13 and rot19:

   Five weary quacking ducks hobble past a jinxed maltese shitzu

   b) Write a Java program that accepts as input:
      1. a line of text typed in by a user into a pop-up dialog box and
      2. an integer between 1 and 25 typed in by the user into another pop-up dialog box.

   If the user types in an integer that is less than 1 or greater than 25, the program should keep prompting the user for a value in the right range until s/he inputs such a value. Use Java's built-in Integer class to handle the numeric input.

   The output of the program should be:
      1. a pop-up box that displays an encrypted version of the line of text input by the user using rot**n** where n is the number between 1 and 25 that the user entered.
      2. a pop-up box that displays a decrypted version of the encrypted text using rot(**26-n**). (If your algorithm is correct, this decrypted text should be the same as the original typed in by the user).

   Only lower and upper-case characters from the English alphabet ('a' to 'z' and 'A' to 'Z') should be encrypted; spaces, punctuation marks, and all other characters should remain unchanged. Please read section 2.5 of the Savitch text and make use of the JOptionPane class for displaying all pop-up boxes. <u>Please do not use Java's built-in Character class in solving this problem.</u> To test that your program works correctly, use the sentence from a):

   Five weary quacking ducks hobble past a jinxed maltese shitzu

   Rotate it by 5 characters, by 13 characters and by 20 characters (i.e., rot5, rot13, and rot20). Also test your program on the following sentences and write out the results:

   1. **Jxu qhuq kdtuh jxu husuyluh-efuhqjeh sxqhqsjuhyijys skhlu yi 0.88.**
      (rotate this by 10 characters)
   2. **Ojlcxarju(w) = w * Ojlcxarju(w - 1)**
      (rotate this by 17 characters)

2. A hospital lab has a register that contains a list of all patients tested at the lab, their patient ID numbers, first names, last names, dates of birth, addresses, and home telephone numbers. In addition, each lab technician (there are 15 in this lab) maintains a separate register for all the tests s/he does. Patient test results are stored in a lab technician's register, not in the main register. Each technician's register contains the patient ID numbers of all the patients the tech has performed tests on. Next to the patient ID number, the tech writes the name of the administered test, the test result, and the date on which the test was performed. Each lab tech is qualified to

perform any test the hospital lab requires. Over time, it is possible for a patient to have tests performed by each of the different lab techs and consequently, have entries present in any or all of the 15 lab technicians' registers.

i) The lab gets a call from Mr. Daniel Norton asking for the results of his most recent serum sodium tests. The receptionist asks him for his demographics. Describe the steps she would have to take to find this lab result for Mr. Norton (her algorithm for finding his most recent serum sodium test results), given the lab's record keeping methods. Do not assume that demographics can uniquely identify a patient. However, each patient has a unique patient ID number.

The lab gets many such calls each day and the receptionist is going crazy. The lab director has asked you to create an object-oriented computer-based filing system to make record keeping and responses to such calls more efficient. **You are allowed to completely discard the current record keeping system and create a new, efficient design.**

   (1) List the classes that you would use in creating this computer-based filing system, the attributes and methods of these classes and their types (note that Java has a built-in GregorianCalendar class for representing dates and times).
   (2) Write an algorithm that the computer-based filing system would use for finding a patient's lab results
   (3) Write out Java definitions of each class you listed in (1) (each class description in a separate file). Store the information on the following three patients into your program code by instantiating objects of the appropriate classes:

ii) ID: 9876BWH
    First name: Daniel
    Last Name: Norton
    Date of birth: 5/4/1935
    Address: 422 Main Street, Anytown, MA 01001
    Phone: 617-111-1111

Test name	Date performed	Result
Serum sodium	9/6/2002	137
Serum sodium	5/15/2002	142
Serum potassium	5/15/2002	4.5
Total cholesterol	4/1/1999	220
Total cholesterol	3/20/2001	180

iii) ID: 3456MGH
     First name: Jasmeet
     Last Name: Sidhu
     Date of birth: 11/30/1965
     Address: 95 Washington Street, Springfield, MA 01005
     Phone: 617-111-2222

Test name	Date performed	Result
Hemoglobin	6/12/2002	14.8
INR	7/22/2002	3.6

iv) ID: 6790TCH
    First name: Angela
    Last Name: Summertop
    Date of birth: 11/30/1986

Address: 815 South Pleasant Street, Amherst, MA 01002
Phone: 617-111-3333

Test name	Date performed	Result
HCG	4/6/2002	254000

b) Implement the algorithm in c) using the Java classes you defined. Write a program with a main method that prints out the result of Mr. Norton's most recent serum sodium test using the classes and algorithms you created.

Note: When we discuss databases later in the semester, other approaches to solving this record-keeping problem will become apparent.