THIRD QUIZ

You have 20 minutes from the start of class to complete this quiz. Give partial answers if you can't give complete ones. Read the questions with care; work with deliberate speed. Don't give us more than we ask for. The usual instructions apply. Good luck!

Problem 1 (12 points)

Attached is a version of the restaurant collection program that uses an ArrayList. It has one new feature: The command '`h`' prints out the name of the restaurant in the collection with the highest-priced dish.

(a) (8 points) In the RList class, the definition for `getHighestPricedRrant` is incomplete. Fill it in, using the space on the program listing.

(b) (4 points) In the main Q3RPArrayList class, we have modified `printMenu` to list the new command. We have left two blank lines in `handleCommands` to handle printing the name of the highest-priced restaurant. Fill in those lines.

Problem 2 (13 points)

Your local radio station wants to computerize its collection of CDs. They have asked you consider these three alternative data structures:

I. A conventional linked list, in no particular order

II. An array ordered by CD title, with an additional field that stores the number of CDs in the collection

III. A binary search tree, ordered by CD title.

When we ask for O-notations below, give the closest-fit O-notation in terms of *n*, the number of CDs n the collection, assuming each operation is coded as efficiently as possible in Java.

(a) (4 points) Suppose the first task is to add all the CD data into the new system. Which of the three data structures would be most efficient for this task alone? As part of your answer, give each alternative's O-notation for adding a CD to the collection.

(b) (4 points) A DJ spends most of his or her time looking up CDs by title. What is each data structure's O-notation for locating a CD by title? Which data structure do you most want to avoid for this task?

(c) (4 points) The station manager wants to know at any given moment exactly how many CDs are in the collection. Give each alternative's O-notation for determining the number of CDs and say which alternative is most efficient for this operation. Don't assume the existence of any data fields not specified above.

(d) (1 point) What would be the best data structure to use for implementing this collection, and (in one brief sentence including O-notations where appropriate) why? Assume that task (a) will be done just once and that most of the collection's usage will be split evenly between tasks (b) and (c). You may propose small modifications to the data structures described above if they would help produce a clear winner.