AP Free Response Student Grades

Consider a system for processing student test scores. The following class will be used as part of this system and contains a student's name and the student's answers for a multiple-choice test. The answers are represented as strings of length one with an omitted answer being represented by a string containing a single question mark ("?"). These answers are stored in an ArrayList in which the position of the answer corresponds to the question number on the test (question numbers start at 0). A student's score on the test is computed by comparing the student's answers with the corresponding answers in the answer key for the test. One point is awarded for each correct answer and ¼ of a point is deducted for each incorrect answer. Omitted answers (indicated by"?") do not change the student's score.

The following table shows an example of an answer key, a student's answers, and the corresponding point values that would be awarded for the student's answers. In this example, there are six correct answers, three incorrect answers, and one omitted answer. The student's score is ((6 * 1) - (3 * 0.25)) = 5.25 .

Question number	0	1	2	3	4	5	6	7	8	9
answers key	"A"	"C"	"D"	"E"	"B"	"C"	"E"	"B"	"C"	"C"

student answers	"A"	"B"	"D"	"E"	"A"	"C"	"?"	"B"	"D"	"C"
Points awarded	1	–0.25	1	1	–0.25	1	0	1	–0.25	1

Part (a) Write the *StudentAnswerSheet* method *getScore*. The parameter passed to method *getScore* is an ArrayList of strings representing the correct answer key for the test being scored. The method computes and returns a double that represents the score for the student's test answers when compared with the answer key. One point is awarded for each correct answer and ¼ of a point is deducted for each incorrect answer. Omitted answers (indicated by"?") do not change the student's score.

Part (b) Write the *TestResults* method *highestScoringStudent*,which returns the name of the student who received the highest score on the test represented by the parameter *key*.
If there is more than one student with the highest score, the name of any one of these highest-scoring students may be returned. You may assume that the size of each answer sheet represented in the ArrayList sheets is equal to the size of the ArrayList *key*. In writing *highestScoringStudent*,assume that *getScore* works as specified, regardless of what you wrote in part (a).

```
/***
 * Class StudentAnswerSheet <<< This Code is NOT complete >>>
 */
import java.util.ArrayList;

public class StudentAnswerSheet
{
  private ArrayList<String> answers;  // the list of the student's answers
  private String name;

  public StudentAnswerSheet(String nm, ArrayList<String> ans)
  {
    name = nm;
    answers = new ArrayList<String>();
    for (String a : ans)
      answers.add(a);
  }

  /** @param key the list of correct answers, represented as strings of length one
   *         Precondition: key.size() is equal to the number of answers in this answer sheet
   *  @return this student's test score
   */
  public double getScore(ArrayList<String> key)
  {
     /*** Part (a) ***/
  }


  /** @return the name of the student
   */
  public String getName()  {
    return name;
  }
}
```

```
/***
 * Class TestResults <<< This Code is NOT complete >>>
 */
import java.util.ArrayList;

public class TestResults
{
  private ArrayList<StudentAnswerSheet> sheets;

  public TestResults(ArrayList<StudentAnswerSheet> shs)
  {
    sheets = new ArrayList<StudentAnswerSheet>();
    for (StudentAnswerSheet s : shs)
      sheets.add(s);
  }

  /** Precondition: sheets.size() > 0;
   *                all answer sheets in sheets have the same number of answers
   * @param key the list of correct answers represented as strings of length one
   *        Precondition: key.size() is equal to the number of answers
   *                      in each of the answer sheets in sheets
   * @return the name of the student with the highest score
   */
  public String highestScoringStudent(ArrayList<String> key)
  {
          /*** Part (b) ***/
  }

}
```

```
/***
 * Tester Class with expected output:
 *
 * Amy: 5.25
 * Ben: 5.5
 * Cory: 6.5
 * Mark: 7.5
 * Best: Mark
 *
 */
import java.util.ArrayList;
import java.util.Arrays;

public class TestScore
{
  public static void main(String[] args)
  {
    ArrayList<String> key = new ArrayList<String>(Arrays.asList(
            new String[] {"A", "C", "D", "E", "B", "C", "E", "B", "B", "C"}));

    ArrayList<String> answers1 = new ArrayList<String>(Arrays.asList(
            new String[] {"A", "B", "D", "E", "A", "C", "?", "B", "D", "C"}));

    ArrayList<String> answers2 = new ArrayList<String>(Arrays.asList(
            new String[] {"A", "?", "D", "E", "A", "C", "?", "B", "D", "C"}));

    ArrayList<String> answers3 = new ArrayList<String>(Arrays.asList(
            new String[] {"A", "?", "D", "E", "A", "C", "E", "B", "D", "C"}));

    ArrayList<String> answers4 = new ArrayList<String>(Arrays.asList(
            new String[] {"A", "C", "D", "E", "A", "C", "E", "B", "D", "C"}));

    ArrayList<StudentAnswerSheet> sheets = new ArrayList<StudentAnswerSheet>();

    sheets.add(new StudentAnswerSheet("Amy", answers1));
    sheets.add(new StudentAnswerSheet("Ben", answers2));
    sheets.add(new StudentAnswerSheet("Cory", answers3));
    sheets.add(new StudentAnswerSheet("Mark", answers4));


    for (StudentAnswerSheet s : sheets)     {
      System.out.println(s.getName() + ": " + s.getScore(key));
    }
    TestResults results = new TestResults(sheets);
    System.out.println("Best: " + results.highestScoringStudent(key));
```

```
  }
}
```