**Software Development 4**

**Continuous Assessment 1 (35%)**

**Friday 5th March 2021**

**Duration: 1 hour 40 minutes**

**Please note rules regarding plagiarism**

**Instructions:**

* You may use your lecture notes, textbooks and any personal notes you wish.
* Create a project called Ca1XnumberLastnameFirstname and create a package inside this project.
* *Your programs should be saved during the assessment.*
* ***Include your name and student number as a comment at the top of each file.***
* ***At the end of the CA, zip the project folder and upload it.***
* ***It is your responsibility to ensure that you have uploaded all the correct files i.e. the .java files.***

**Problem:**

You are required to design and develop a system used to manage team performance at sporting competitions. In particular the Football League of Europe needs a program for tracking the performance of teams in the league.. The program must generate a league table which shows the standings of each team after 4 matches are played.

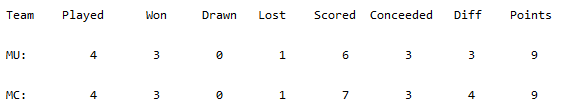
More specifically your system should have the following Java classes:

**Competition Class (10%)**

* This class is abstract
* Has two member variables
  + A private int to hold the number of teams
  + A private String to hold the competition name
* A **constructor** intowhich values for the competition name and number of teams are passed and these instance variables are set based on the arguments passed into the constructor.
* An abstract method called processResults() which doesn’t take any parameters and doesn’t return anything.

**FootballCompetition Class (80%)**

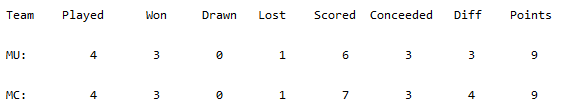
* This class is a sub class of **Competition**
* Has two member variables
  + A private String array to hold the team names
  + A private 2D integer array to hold the league table stats
* A **constructor** intowhich values for the number of teams and competition name are passed, and these instance variables are set based on the arguments passed into the constructor. Use the number of teams as the size to create the team names array and to set the number of rows in the 2D array. The number of columns in the 2D array can be determined from the table in the sample output.
* A **processResults()** method which overrides the **processResults()** method from the superclass. This method should populate both arrays with data read in from the keyboard.
  + For each team, the team name should be entered at the keyboard and stored in the 1D array
  + For each team, the number of games played, games won, games drawn, games lost, goals scored, & goals conceded should all be read in from the keyboard and stored in the 2D array.
  + The 2D array has two more columns as shown in the sample output for goal difference (Diff) and points. These should be calculated as follows:
    - Goal difference = (goals scored – goals conceded)
    - Points are calculated based on 3 points for a win, 1 point for a draw, and 0 points for a loss
* A **printTable()** method which prints out the league table formatted as shown below:



* Inside the **printTable()** method, write the code to calculate the average number of goals scored per team and display the number of teams where the number of goals scored exceeded this average as shown below:



* A **calcWinnerGoalDiff()** method to determine the leader based on goal difference if multiple teams share the highest number of points. If more than one team shares the same highest score in terms of points, then the leader is the team with the highest goal difference. In the table below, MU and MC are both on 9 points, but MC has the higher goal difference (Diff column shown below) so this team is the leader.



**TestCompetition class (20%)**

Ask the user to enter the name of the competition and the number of teams

Create an object of type FootballCompetiton

Call the 3 methods to process the results, display the table and to calculate the winner based on goal difference.

**Sample Output**

