University of Glasgow | School of Computing Science

DayOfWeek DayOfMonth December 2013

XX.XX am/pm – XX.XX am/pm

(Duration: 1 hour 30 minutes)

EXAMINATION FOR

DEGREES OF MSci, MEng, BEng, BSc, MA and MA (Social Sciences)

Computing Science 2P
Java Programming 2

CLASS TEST

Answer ALL parts of ALL of the questions

This examination paper is worth a total of 50 marks

You should attempt all questions in parts A and in part B.

You must not leave the examination room within the first 30 minutes or the last 15 minutes of the examination.

INSTRUCTIONS TO INVIGILATORS

Please collect all exam question papers and return to School together with exam answer scripts.

Part A: This part consists of 10 short questions. Each question is worth 2 marks.

(1) What is the output for the following code?

```
for (int i=0; i<5; i++) {
  System.out.print((i%2==0)?"a":"b");
}
```

(2) What is the output for the following code?

```
for (int i=0; i<5; i++) {
  System.out.print(i++);
}
```

(3) What is the output for the following code?

```
while (true) {
  System.out.print("a");
  break;
}
```

(4) What is the output for the following code?

```
try {
  System.out.print("a");
}
finally {
  System.out.print("b");
}
```

(5) What is the output for the following code?

```
try {
  System.out.print("a");
  System.exit(0);
}
finally {
  System.out.print("b");
}
```

(6) What value is stored in variable `i`?

```
int i = 1/0;
```

(7) What value is stored in variable `d`?

```
double d = 1.0/0;
```

(8) What value is stored in variable `b`?

```
byte b = (byte)1024;
```

(9) What value is stored in variable `b`?

```
byte b = (byte)128;
```

(10) What value is stored in variable `i`?

```
int i = (int)-1e10;
```

(20 marks)

Part B: Answer all four questions.

(1) Below is a football result from a Scottish newspaper.

```
1 October 2011

  East Fife 4 (3)     Forfar 5 (2)
   Ovenstone 15        Byers 19
   Muir 32             Ovenstone 40
   Ogleby 44           Shaughnessy 53
   Wallace 83          McDonald 88
                       McDonald 89

Attendance: 533
```

This printed result shows the date of the match as 1 October 2011. The home team is East Fife. The away team is Forfar. The result was a win for Forfar, by 5 goals to 4. The numbers in brackets indicate the half time scores (after 45 minutes). The names underneath each team indicate the players who scored goals, and the time in minutes at which their goals were scored. Finally the number of people attending the match is reported.

Given the class `Team` with constructor

```
public Team(String name)
```

and the class `Player` with constructor

```
public Player(String name)
```

and the class `Goal` with constructor

```
public Goal(Player p, int minutes)
```

and the class `Date` with constructor

```
public Date(int day, String month, int year)
```

You must define a class `MatchResult` that encapsulates all the data that would be required for a newspaper result like that shown above.

- Provide appropriate instance fields and accessor methods in `MatchResult`.
- Provide a constructor

```
public MatchResult(Date date,
                   Team homeTeam,
                   Team awayTeam)
```

- Provide state mutator methods

```
public void recordGoal(Player player,
                       int minutes)
public void recordAttendance(int attendance)
```

Assume the classes `Team`, `Player`, `Goal` and `Date` have appropriate `toString()` methods defined to print out the data in the format shown above. You should define a `toString()` method that prints out the complete `MatchResult` state in the newspaper result format.

(10 marks)

(2) As part of the above class `MatchResult`, define an instance method `pointsForTeam(Team team)` which returns an `int` value. The method should compute the points acquired by the team based on the `MatchResult`. A winning team gets 3 points, a drawing team gets 1 point, a losing team gets 0 points. You should also define a custom `TeamNotPlayingException` which the method throws if the team is not involved in the `MatchResult`. Assume that the `equals()` method is defined appropriately for `Team` objects.

(7 marks)

(3) Now write a utility method `collectPointsForTeam` that takes in a `Team` and a `List` of `MatchResult` objects, and computes the total points for that `Team` based on the `MatchResult`s. Be aware that the `Team` may not feature in all the matches.

(7 marks)

(4) What is meant by *polymorphism* in Java? Illustrate the concept using a class A and a class B that extends A.

(6 marks)