1 Project Description

In this assignment there are 4 parts. For each part you should:

- Write the appropriate code.
- Include comments within the code to explain what the code does.
- Test the code to ensure its correctness.
- Format and structure the code to maximise its readability.

A report must be submitted containing a cover page, the solutions to each of the four parts, and your code, as a PDF using the vUWS assignment submission page.

The cover page must contain your name, student number, unit number and name, and the declaration below.

Submission is due by 11:59pm Friday, January 25 (Sydney Time) via email to Dr Barnes: L.Barnes2@westernsydney.edu.au . Late submissions will receive a 10% reduction in marks for each day late.

2 Marking Criteria

This assignment is worth 40% of the unit assessment tasks. There four problems to investigate and 10 marks available for each of the four questions. The marking criteria for each question is given in Table 1.

When writing the solutions to each of the four parts, make sure to consult the marking criteria and check that you have covered them. The project will be marked using this criteria.

Criteria	Q1	Q2	Q3	Q4
Code Correctness (5 marks)				
Comments explaining code (2 marks)				
Code Testing (1 mark)				
Code Style and Readability (2 marks)				
Total (10 marks)				

Table 1: Marking criteria for each part of this project.

Batsman	How Out	Runs	Balls	4s	6s	SR
KL Rahul	c Finch b Hazlewood	2	8	0	0	25.00
M Vijay	c †Paine b Starc	11	22	1	0	50.00
CA Pujara	run out (Cummins)	123	246	7	2	50.00
V Kohli (c)	c Khawaja b Cummins	3	16	0	0	18.75
AM Rahane	c Handscomb b Hazlewood	13	31	0	1	41.93
RG Sharma	c Harris b Lyon	37	61	2	3	60.65
RR Pant †	c †Paine b Lyon	25	38	2	1	65.78
R Ashwin	c Handscomb b Cummins	25	76	1	0	32.89
I Sharma	b Starc	4	20	1	0	20.00
Mohammed Shami	c †Paine b Hazlewood	6	10	1	0	60.00
JJ Bumrah	not out	0	0	0	0	-

Table 2: India's first innings results.

3 Declaration

Before submitting the assignment, include the following declaration in a clearly visible and readable place on the cover page of your project report.

By including this statement, we the authors of this work, verify that:

- We hold a copy of this assignment that we can produce if the original is lost or damaged.
- We hereby certify that no part of this assignment/product has been copied from any other student's work or from any other source except where due acknowledgement is made in the assignment.
- No part of this assignment/product has been written/produced for us by another person except where such collaboration has been authorised by the subject lecturer/tutor concerned.
- We are aware that this work may be reproduced and submitted to plagiarism detection software programs for the purpose of detecting possible plagiarism (**which may retain a copy on its database for future plagiarism checking**).
- We hereby certify that we have read and understand what the School of Computing, Engineering and Mathematics defines as minor and substantial breaches of misconduct as outlined in the learning guide for this unit.

Note: An examiner or lecturer/tutor has the right not to mark this project report if the above declaration has not been added to the cover of the report.

4 Project Questions

The scorecard in Table 2 is from the first innings of the first cricket test in the Australia vs India 2018 series. http://www.espncricinfo.com/series/18693/scorecard/1144993/australia-vs-india-1st-test-india-in-aus-2018-19

The columns show:

- Batsman: The name of the batsman.
- How Out: How the batsman was given out.
- Runs: The number of runs made by the batsman.
- Balls: The number of balls faced by the batsman.
- 4s: The number of 4s hit by the batsman.
- 6s: The number of 6s hit by the batsman.
- SR: The batsman's strike rate (100*Runs/Balls).

4.1 Validating the Strike Rate

Cricinfo believe that there is a bug in their code that computes the batsman's strike rate (SR), and so they want you to verify the numbers.

Write the code to:

1. Create a data frame in R containing the data from Table 2.
2. Compute the strike rate using the data frame from the Runs and Balls.
3. Subtract your computed strike rate from the data frame column SR.

Finally, state if your output shows errors in the data, and where the errors occur.

4.2 Ball Outcome

Cricinfo want to create a simple cricket simulator to test their scorecard and so have come to you for help.

After a ball is bowled, there are eight possible outcomes. Below we list the eight outcomes and each outcome's effect on the score:

- 0 runs: add 1 to the ball count
- 1 run: add 1 to the ball count, add 1 to the run count
- 2 runs: add 1 to the ball count, add 2 to the run count
- 4 runs: add 1 to the ball count, add 4 to the run count, add 1 to the 4s count
- 6 runs: add 1 to the ball count, add 6 to the run count, add 1 to the 6s count
- Wide: add 1 to the extras count
- No ball: add 1 to the extras count
- Out: add 1 to the ball count, mark batsman as out

Cricinfo store a batsman's record using the variable:

```
state = list(balls = 0, runs = 0, fours = 0, sixes = 0, extras = 0, out = FALSE)
```

Write the function `oneBall` that takes the input `state` and one `outcome` and returns the updated `state` based on the eight outcomes above.

4.3 Batsman's score

A batsman keeps facing balls until the batsman is out. To simulate a single batsman, we need to:

1. Randomly sample one of the eight outcomes,
2. Update the score state,
3. Repeat until the outcome is `Out`.

Write the function `oneBatsman` that randomly samples one of the eight outcomes from above, updates the score using your function `oneBall`, then repeats until the outcome is `Out`. Note that we can randomly sample an outcome using:

```
outcome = sample(c("0 runs", "1 runs", "2 runs", "4 runs", "6 runs",
    "Wide", "No Ball", "Out"), size = 1)
```

4.4 Team Score

The final piece of the simulation is to simulate the score for the whole team, and compute the team score.

Write a function that contains the code to:

1. Simulate the scores for 10 batsmen (using the function `oneBatsman`).
2. Add the runs and extras from each batsman to obtain the team score.