

# Assessment Brief Template

Academic Year	2022/2023
Semester	Semester 2
Module Number	CM1606
Module Title	Computational Mathematics
Assessment Method	
Deadline (time and date)	26th of April 2023, 4:00 p.m. (IST)
Submission	Assessment Dropbox in the Module Study Area in CampusMoodle.
Word Limit (see <a href="#">Assessment Word Limit Statement</a> )	
Module Co-ordinator	Ganesha Thondilege

What knowledge and/or skills will I develop by undertaking the assessment?

Data representation, analysis, and visualization; application of statistical models and hypothesis testing to real-world problems

**On successful completion of the assessment students will be able to achieve the following**

**Learning Outcomes:**

1. Apply a range of statistical distribution models and hypothesis testing to real-world problems.
2. Represent, analyze and visualize data, in order to infer helpful insights about data collections.
- 3.
- 4.
- 5.

**Please also refer to the Module Descriptor, available from the module Moodle study area.**

What is expected of me in this assessment?

**Task(s) - content**

## What is expected of me in this assessment?

*What is expected of the students in this assessment?*

*Make explicit reference to the relevance of the material content each week to the learning outcomes and the assessment task(s).*

*To have data summarizing and visualization skills; the ability to identify the strength of the linear relationship in a given dataset; understanding of basic statistical concepts like expected value, variance, SD, etc in a discrete distribution; knowledge of the most important statistical model (normal model) and related applications; knowledge on re-sampling techniques using R software and obtaining sampling distribution (and bias) of the sample mean for a given dataset.*

## Task(s) - format

*How should the students structure and present this assessment?*

*Specify content requirements in line with the [Assessment Word Limit Statement](#) so that students have complete clarity over the structure and layout. The Assessment Word Limit Statement advises on which constituent parts of the structure are included in the word count, but this space should identify which constituent parts are required in this assessment.*

*Consider Moodle dropbox requirements, as relevant (See [Digital Learning Standard](#)).*

## How will I be graded?

A grade will be provided for each criterion on the feedback grid which is specific to the assessment.

The overall grade for the assessment will be calculated using the algorithm below. [\[Amend as appropriate to your module.\]](#)

How will I be graded?	
<b>A</b>	At least 50% of the feedback grid to be at Grade A, at least 75% of the feedback grid to be at Grade B or better, and normally 100% of the feedback grid to be at Grade C or better.
<b>B</b>	At least 50% of the feedback grid to be at Grade B or better, at least 75% of the feedback grid to be at Grade C or better, and normally 100% of the feedback grid to be at Grade D or better.
<b>C</b>	At least 50% of the feedback grid to be at Grade C or better, and at least 75% of the feedback grid to be at Grade D or better.
<b>D</b>	At least 50% of the feedback grid to be at Grade D or better, and at least 75% of the feedback grid to be at Grade E or better.
<b>E</b>	At least 50% of the feedback grid is to be at Grade E or better.
<b>F</b>	Failing to achieve at least 50% of the feedback grid to be at Grade E or better.
<b>NS</b>	Non-submission.

## Feedback grid *Add more rows/criteria if necessary, up to a maximum of 8.*

GRADE	A	B	C	D	E	F
DEFINITION / CRITERIA (WEIGHTING)	EXCELLENT Outstanding Performance	COMMENDABLE/VERY GOOD Meritorious Performance	GOOD Highly Competent Performance	SATISFACTORY Competent Performance	BORDERLINE FAIL	UNSATISFACTORY Fail
CRITERION 1  (x %) Grade: <input type="text"/>						
CRITERION 2  (x %) Grade: <input type="text"/>						
CRITERION 3  (x %) Grade: <input type="text"/>						
CRITERION 4  (x %) Grade: <input type="text"/>						

*Coursework received late, without valid reason, will be regarded as a non-submission (NS) and one of your assessment opportunities will be lost.*

## What else is important to my assessment?

### What is plagiarism?

"Plagiarism is the practice of presenting the thoughts, writings or other output of another or others as original, without acknowledgment of their source(s) at the point of their use in the student's work. All materials including text, data, diagrams, or other illustrations used to support a piece of work, whether from a printed publication or from electronic media, should be appropriately identified and referenced and should not normally be copied directly unless as an acknowledged quotation. Text, opinions or ideas translated into the words of the individual student should in all cases acknowledge the original source" ([RGU 2022](#)).

### What is the collusion?

"Collusion is defined as two or more people working together with the intention of deceiving another. Within the academic environment this can occur when students work with others on an assignment, or part of an assignment, that is intended to be completed separately" ([RGU 2022](#)).

For further information please see [Academic Integrity](#).

### What is the Assessment Word Limit Statement?

It is important that you adhere to the Word Limit specified above. The Assessment Word Limit Statement lists what is included and excluded from the word count, along with the penalty for exceeding the upper limit.

### What if I'm unable to submit?

- The University operates a [Fit to Sit Policy](#) which means that if you undertake an assessment then you are declaring yourself well enough to do so.
- If you require an extension, you should complete and submit a [Coursework Extension Form](#). This form is available on the RGU [Student and Applicant Forms](#) page.
- Further support is available from your Course Leader.

### What additional support is available?

- [RGU Study Skills](#) provide advice and guidance on academic writing, study skills, maths and statistics and basic IT.
- [RGU Library guidance on referencing and citing](#).
- [The Inclusion Centre: Disability & Dyslexia](#).
- Your Module Coordinator, Course Leader and designated Personal Tutor can also provide support.

What else is important to my assessment?

**What are the University rules on assessment?**

The University Regulation '[A4: Assessment and Recommendations of Assessment Boards](#)' sets out important information about assessment and how it is conducted across the University.

Instructions to Candidates:

1. There are 6 questions in the assignment. Answer all questions.
2. Each question is worth 10 marks with a breakdown as shown.
3. Use of R software is optional unless you are asked to use it for certain calculations and plots.

**QUESTION 1.**

The following are the GPAs for a class of 30 students (rounded to one decimal):

2.0, 2.1, 3.2, 3.1, 3.6, 2.8, 1.9, 1.8, 2.8, 3.0, 1.9, 1.8, 2.0,  
2.1, 2.0, 2.2, 2.2, 3.4, 3.5, 3.0, 3.1, 2.0, 2.3, 2.6, 3.1, 3.3,  
3.7, 2.9, 2.3, 2.0

1. Calculate the mean GPA for the class.

(2 marks)

2. What's the median GPA?

(2 marks)

3. Calculate the 5-number-summary and make a Boxplot (using R); copy the image and paste it into your answer script.

(3 marks)

4. Make a histogram using R; copy and paste it to your answer script. Comment on the performance of the class based on your findings.

(3 marks)

(Total 10 marks)

## QUESTION 2.

Sales of a particular product over a period of eight months, are given below:

Month (X):	1	2	3	4	5	6	7	8
Sales (Y):	10	14	11	24	29	22	24	18

(Rs. 1000's)

1. Make a scatterplot of X and Y and comment on the type of relationship between X and Y

(2.5 marks)

2. Calculate the Pearson's correlation coefficient (default in R) between months number and sales

(2.5 marks)

3. Calculate the Pearson's correlation coefficient between months number and sales only for the first five months

(2.5 marks)



4. Comment on your results of (b) and (c) in relation to the given data (2.5 marks)

(Total 10 marks)

### QUESTION 3.

A and B play a game where a balanced six sided die is rolled once. If the outcome is 2 or 5, B must give \$300 to A (i.e. B loses \$300). If the outcome is any other number, A must give \$75 to B (i.e. A loses \$75).

Let  $X = \text{Amount won by A.}$

1. Construct the probability mass function (pmf) of  $X$ . (4 marks)
2. Calculate the 'expected win' for A in this game. (3 marks)
3. Calculate standard deviation (SD) of  $X$ . (3 marks)

(Total 10 marks)

### QUESTION 4.

Suppose 3% of a large population is infected with Covid-19. Let  $X =$  the Number of infected persons in a random sample of size twelve from this population.

1. Giving reasons, identify the most suitable distribution for  $X$  (You need to specify the name and the parameters) (4 marks)
2. Find the probability that less than four persons are infected (2 marks)
3. Find the mean and the variance of  $X$  (2 marks)
4. Using R (or otherwise) find  $P(X > 4)$ . (2 marks)

(Total 10 marks)

### QUESTION 5.

A class of 40 students got marks that range from 25 to 70 for mathematics. Assume that the marks are approximately normally distributed with a mean of 47 and standard deviation (SD), 7. Using R, obtain the following:

1. 90<sup>th</sup> percentile mark in the class (2.5 marks)
  2. 65<sup>th</sup> percentile mark in the class (2.5 marks)
  3. Median mark in the class (2.5 marks)
  4. Percentage of students below 50 marks (2.5 marks)
- (Total 10 marks)

#### QUESTION 6.

Write R Codes to estimate the sampling distribution of the sample mean for the dataset {1, 2, 3, 5, 5, 8, 7, 6, 8, 9}, using bootstrap. You may use 2000 bootstrap samples. Also, estimate the bias of the sampling distribution.

(Total 10 marks)