SCHOOL OF MATHEMATICAL SCIENCES

BACHELOR OF SCIENCE (HONS) IN ACTUARIAL STUDIES
BACHELOR OF SCIENCE (HONS) IN INDUSTRIAL STATISTICS
BACHELOR OF SCIENCE (HONS) IN FINANCIAL ANALYSIS
BACHELOR OF SCIENCE (HONS) IN FINANCIAL ECONOMICS

ACADEMIC SESSION: AUGUST 2020 SEMESTER

MAT1034 INTRODUCTION TO PROBABILITY

INDIVIDUAL ASSIGNMENT

DUE DATE: 24 OCTOBER 2020, 2pm

INSTRUCTIONS TO CANDIDATES

1. There are **FOUR (4)** pages in this Assignment including the cover page.
2. This assignment will contribute 30**%** to your final grade.
3. This is an **individual assignment**.
4. The assignment must be typewritten with Times New Roman, font size 12 and double line spacing on A4 size paper. The assignment should be submitted with a cover sheet which includes your name and ID number, subject name, subject code, and lecturer's name. You should rename your file according to the following format before submission: ***StudentNameStudID.pdf***
5. Present the R codes and results neatly (Screen shot). Marks will be allocated for correctness and clarity of presentation.

IMPORTANT

Assignments must be submitted on their due dates. If an assignment is submitted after its due date, the following penalty will be imposed:

- One to two hours late : 20% deducted from the total marks awarded.
- Three to five hours late : 40% deducted from the total marks awarded.
- More than five hours late : Assignment will not be marked.

Question 1 (10 Marks)

a) Create a "random sphere" whose radius, r, is determined by the distribution table given below.

Radius, *r*	1	2	3	4	5	6
$P(r)$	0.25	0.1	0.3	0.2	0.10	0.05

Let V be the volume of the sphere. Find $E[V]$. Show all your calculation.

b) Using R, generate n radius values based on the assigned probabilities to obtain volume for n spheres. Complete the table below.

n	$E[V]$
10	
100	
1000	

c) Compare and discuss the answers in part (a) and (b).

Description	**Mark allocation**
a) Calculation	2
b) R code. Outcomes	5
c) Discussion	3

Question 2 (10 Marks)

Select one dataset from the Question 2 folder that is available on eLearn. In your report, specify the dataset name and description. Data description can be obtained from https://rdrr.io/cran/Stat2Data/man/AccordPrice.html. Attach the first 10 records of your dataset in appendix.

a) Provide the list of variables and the description for the dataset you have selected in the table below:

Variable	Description

b) Identify a continuous random variable from the dataset you have chosen. Using R, apply summary() function on the continuous random variable that you have chosen from the dataset. Discuss the values of the summary and comment on the distribution of the data.

c) Using R, calculate the standard deviation for this continuous random variable.

d) Using R, create a histogram with all appropriate labels for the variable you have chosen in part (b).

e) Let Y be a random variable that you have chosen in part (b). Using Chebyshev's Theorem, find the value of C such that $P(|Y-\mu| \geq C) \leq 0.25$. Interpret your answer.

Description	Mark allocation
a) Variable description	1
b) R code. Discussion	2
c) Standard Deviation	1
d) Histogram with appropriate labels and limit	2
e) Calculation Interpretation	4

Question 3 (5 Marks)

A multinational company offers a health insurance policy to its employees in Malaysia. This policy offers additional coverages for mental illness, stroke and cancer. The *Question3.csv* file contains the dataset of 500 employees and their choices of the additional coverages. Using R, find the probability that a randomly chosen staff will opt for none of the additional coverages.

Question 4 (5 Marks)

A survey was conducted among 60 undergraduate students on the number of times they had attended the school's tutoring session in the last week. The results are shown below:

Study Mode	**Number of Times**		
	1	**2**	**3**
Full Time	12	25	8
Part Time	2	5	8

a) What is the probability the student visited the tutoring session two times, given that the student is full time?

b) Verify the answer by simulating this in R for $n = 10000$. Provide explanation for each line of your code.

Description	**Mark allocation**
a) Calculation	1
b) Codes and explanation	4

--END OF PAPER--