INTI International College Penang

FINAL
Alternative Assessment

Session	:	**April 2022**
Programme	:	Foundation in Science (CFSI)
Course	:	**STA1202: Statistics**
Date of Examination	:	4 August 2022 (Thursday)
Time	:	9:00am – 11:30am Reading Time : Nil
Duration	:	2 hours + 30 minutes (uploading time)
Special Instructions	:	

This paper consists of **FOUR (4)** questions. Answer **ALL** the questions handwritten showing all steps in either **BLUE/BLACK** ink on foolscap papers. All questions carry equal marks.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Formula Booklet I

Examiner(s)	:	**Ms. Teng Mei Tuan**
Chief Moderator	:	Nurul Asyima binti Zulkeflee

*This paper consists of **5** printed pages, including the cover page.*

FOUNDATION IN SCIENCE (CFSI)
STA1202: STATISTICS
FINAL ALTERNATIVE ASSESSMENT: APRIL 2022 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer **ALL** the questions handwritten showing all steps in either **BLUE/BLACK** ink on foolscap papers. All questions carry equal marks.

Question 1

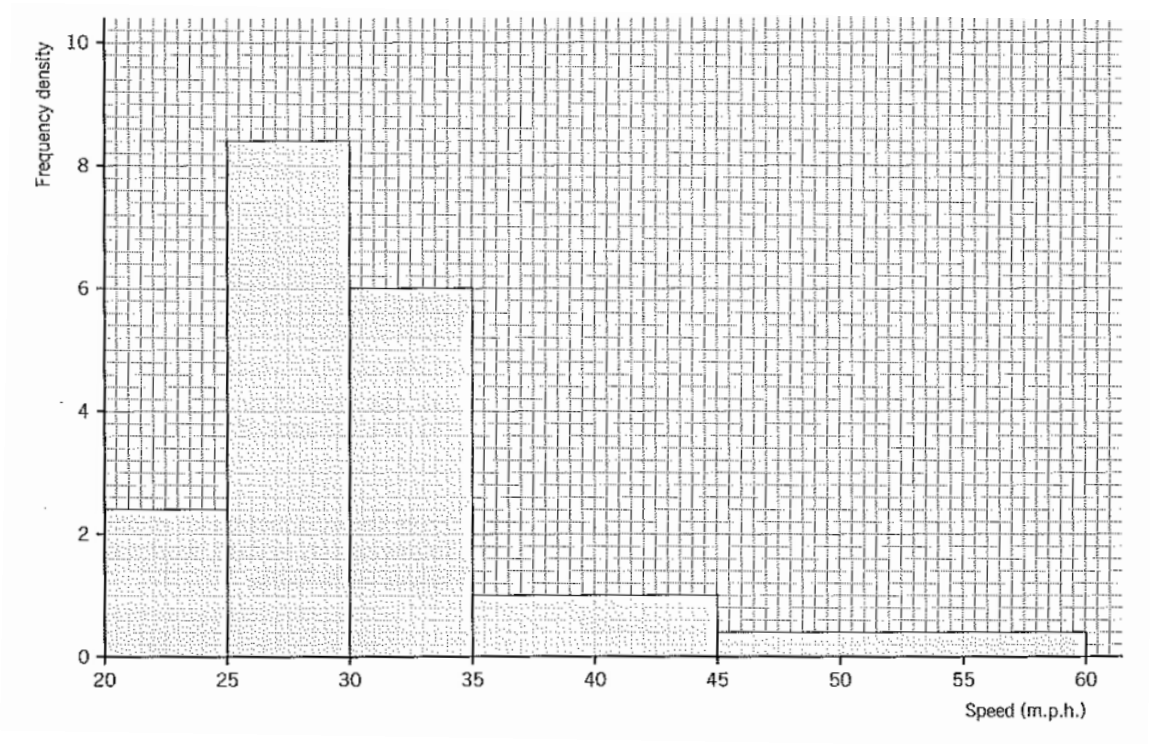
(a) The table below shows the duration (in minutes) taken by 100 students to solve a particular statistics question in an examination.

Duration (minutes)	Number of students
10 but less than 15	6
15 but less than 20	25
20 but less than 25	45
25 but less than 30	18
30 but less than 35	6

(i) Draw a histogram on graph paper and estimate the mode. (5 marks)

(ii) Draw a cumulative frequency curve on graph paper and estimate the number of students who spent 18 to 28 minutes. (5 marks)

(b) The speeds of cars passing a speed camera are shown in the histogram.



(i) Describe the shape of the distribution. (1 mark)

(ii) Copy and complete the table below. (4 marks)

Class boundaries	Width	Frequency density	frequency	Mid-point
20-25 …				

(iii) Estimate the mean and standard deviation for the data. (6 marks)

(iv) Calculate the median by using the formulae: (4 marks)

$$m = L_m + \left[\frac{\frac{\sum f}{2} - F_{m-1}}{f_m} \right] c$$

Question 2

(a) The following table gives a two-way classification of 30 biscuits in a box.

	Wrapped in gold foil	Unwrapped
Chocolate-covered	8	11
Non chocolate-covered	4	7

A biscuit is chosen randomly from the box. Find the probability that

(i) the biscuit is unwrapped, (2 marks)

(ii) the biscuit is chocolate-covered or wrapped in gold foil, (2 marks)

(iii) the biscuit is unwrapped and chocolate-covered, (2 marks)

(iv) the biscuit is non chocolate-covered, given that the biscuit is wrapped in gold foil. (2 marks)

(b) Events A and B are such that $P(A) = 0.3$, $P(B) = 0.5$ and $P(A \cup B) = 0.7$.

(i) Find $P(A \cap B)$. (1 mark)

(ii) Are events A and B independent? Justify your answer. (2 marks)

(iii) Find $P(A \cap B')$. (2 marks)

(iv) Find $P(B' \mid A)$. (2 marks)

(c) A bag contains 10 balls, of which 4 are red and 6 blue. An experiment consists of drawing at random and without replacement two balls, one at a time, from the bag.

(i) Draw a tree diagram to show all the possible outcomes. (4 marks)

(ii) Find the probability that the balls drawn are different colours. (3 marks)

(iii) Given the 2nd ball drawn is blue, find the probability that the 1st ball is also blue. (3 marks)

Question 3

(a) A die is known to be biased in such a way that, when it is thrown, the probability of a 3 showing is $\frac{3}{4}$. This biased die and an ordinary fair die are thrown. Find the probability that

(i) the fair die shows a 3 and the biased die does not show a 3. (2 marks)

(ii) at least one of the two dice shows a 3. (3 marks)

(b) The following table gives the probability distribution of the number of books purchased per hit by Amazon.com shoppers.

Number of books, x	0	1	2	3	4	5
E(X)	0.35	0.2	0.2	a	0.1	0.05

(i) Find the value of a. (1 mark)

(ii) Find the probability of an Amazon.com visitor buying more than 3 books per hit. (1 mark)

(iii) Find the mean and variance of the number of books purchased per hit. (5 marks)

(iv) Find $P(X < \text{mean})$. (2 marks)

(c) The number of accidents occurred in a highway each week is Poisson distributed with a mean of 3.2. Without using a Poisson table, find the probability that there are more than one accidents occurred in 2 weeks. (4 marks)

(d) A washing machine breaks down on an average of 3 times per year.

(i) State one assumptions required for the Poisson model to be valid. (1 mark)

Find the probability that

(ii) exactly 2 breakdown. (3 marks)

(iii) at most one breakdown in half of the year. (3 marks)

Question 4

(a) In the long run 40% of patients treated for a particular disease with the drug Ivermectin are cured. If a doctor were to treat 10 randomly chosen patients with the drug, without using a Binomial table,

(i) find the probability that exactly 7 are cured. (2 marks)

(ii) find the probability that less than 2 are cured. (3 marks)

(iii) find the probability that 6 are not cured. (3 marks)

(iv) calculate the mean and variance of the number of cures in this group of 10 patients. (2 marks)

(b) A manufacturer plans to launch a new tyre model whose life span is normally distributed with mean 40,000 km and standard deviation 4,000 km. A random tyre is selected, calculate

(i) what is the probability that the tyre can be used for not more than 50,000 km? (3 marks)

(ii) what is the probability that the tyre can be used for more than 42,000 km? (3 marks)

(iii) what is the probability that the tyre can be used for 30,000 km to 45,000 km? (3 marks)

The company guarantees to replace the tyres which last less than k km.

(v) Calculate the value of k if the company is prepared to replace only one percent of the tyres sold. (6 marks)

~THE END~