FINAL ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**August 2020**
Programme	:	Diploma in Information Technology (DITN)
Course	:	**STA1106: Quantitative Methods**
Date of Examination	:	December 16, 2020 (Wednesday)
Time	:	8.00am – 10.30 am Reading Time : Nil
Duration	:	2 Hours : 30 Minutes

Note: 30 minutes is added into the duration of the examination to factor in any connectivity matters and for you to scan and upload your scripts.

Special Instructions :

Answer **ALL** questions.

Materials permitted :

Non-Programmable Calculator

Materials provided :

Nil

Examiner(s)	:	**S.M. Elizabethrani Allappan** and Dr Ch'ng Pei Cheng
Chief Moderator	:	Dinesh Kumar

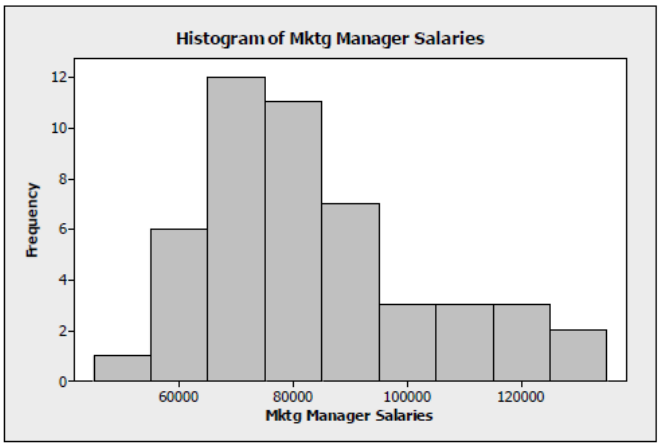
*This paper consists of **7** printed pages, including the cover page*

DIPLOMA IN INFORMATION TECHNOLOGY PROGRAMME (DITN)
STA1106: QUANTITATIVE METHODS
FINAL ALTERNATIVE ASSESSMENT: AUGUST 2020 SESSION

Instructions: This paper consists of **FOUR (4)** questions. Answer **ALL** questions.

Question 1

(a) Following is a histogram of salaries (in RM) for a sample of Malaysia Marketing managers.



(i) Comment on the shape of the distribution.

(2 marks)

Following is the five-number summary of salaries (in RM) for a sample of Malaysia marketing managers

Statistics	Results
Minimum	46360
Quartile 1	69693
Median	77020
Quartile 3	91750
Maximum	129420

(ii) Would you expect the mean salary for this sample of marketing managers to be higher or lower than the median? Explain.

(3 marks)

(iii) Which would be a more appropriate measure of central tendency for these data, the mean or median? Explain.

(3 marks)

(iv) Calculate the range.

(1 mark)

(v) Calculate the IQR.

(2 marks)

Suppose the marketing manager who was earning RM129, 420 got a raise and is now earning RM140,000. Copy the table below and indicate how this change would affect the following summary statistics (increase, decrease, or stay about the same):

Summary statistics	**increase, decrease, or stay about the same**	
Mean		(1 mark)
median		(1 mark)
range		(1 mark)
IQR		(1 mark)
Standard Deviation		(1 mark)

(b) A local unemployment office keeps track of the number of new claims filed each day. Based on the data collected, it determines that the following probability distribution applies:

Number of Claims	**Probability**
0	0.05
1	0.15
2	0.25
3	0.45
4	0.10

(i) Find the expected number of new claims filed each day. (3 marks)

(ii) Determine the standard deviation in the number of new claims filed each day. (3 marks)

(iii) What is the expected number of new claims filed each week? Assume the unemployment office is open 5 days a week. (3 marks)

(Total: 20 marks)

Question 2

(a) At a local manufacturing plant, employees must complete new machine set-ups within 30 minutes. New machine set-up time normally distributed with a mean of 22 minutes and a standard deviation of four minutes.

(i) Find the percentage of new machine set up time that takes more than 30 minutes. (3 marks)

(ii) A typical worker needs five minutes to adjust to their surroundings before beginning their duties. Find the percentage of new machine set up time to be completed within 25 minutes if a worker adjusted to their surroundings in 5 minutes. (3 marks)

(b) A small manufacturing company recently instituted Six Sigma training for its employees. Two methods of training were offered: online and traditional classroom. Below is a table summarizing the data.

	Sales	**Quality**	**Operations**	**Total**
Traditional	16	10	8	34
Online	35	23	44	102
total	51	33	52	136

If an employee is selected at random, find the probability that

(i) an employee chose online training. (3 marks)

(ii) an employee is in the quality division and chose online training. (3 marks)

(iii) an employee chose online training given that he/she is in the sales division. (4 marks)

(c) For quality control purposes, a company that manufactures copper sheets routinely takes samples from its production process. Since the product is often used for decorative purposes, one inspection check involves counting the number of imperfections or flaws on the sheets that measures 36 sq. ft. Suppose the average number of imperfections per sheet of this size is 3. Find the probability that

(i) a sheet of this size has 2 imperfections. (3 marks)

(ii) a sheet of this size has no more than 2 imperfections. (3 marks)

(iii) a sheet half this size (18 sq. ft.) has 2 imperfections. (3 marks)

(Total: 25 marks)

Question 3

(a) Internet service providers (ISP) need to resolve customer problems as quickly as possible. For one ISP, past data indicate that the likelihood is .80 that customer calls regarding Internet service interruptions are resolved within one hour. Out of the next 10 customer calls about interrupted service. Find the probability that

(i) exactly 7 will be resolved within one hour. (3 marks)

(ii) at least 7 will be resolved within one hour. (3 marks)

(iii) How many customers would be expected to have their service problems resolved within one hour? (3 marks)

(b) Top management of a large firm is interested in fostering good relations with their new local community and has encouraged their professional employees to engage in local service activities. They wish to determine the average number of hours the firm's professionals volunteer per month. A random sample of 24 professionals reported the following number of hours:

12	13	14	14	15	15	15	16	16	16	16	16
17	17	17	18	18	18	18	19	19	19	20	21

Based on the sample results, find

(i) the sample mean and standard deviation. (5 marks)

(ii) the 95% confidence interval and interpret. (4 marks)

They believe that the firm's professionals volunteer an average of more than 15 hours per month. If this is not the case, they will institute an incentive program to increase community involvement.

(iii) Test the above claim at 5% significance level. (7 marks)

(Total: 25 Marks)

Question 4

(a) An online book store wants to determine if coupon redemption is independent of gender. After a special coupon broadcast to its reward members, the following data on coupon redemption at check out were collected.

		Coupon Redeemed	
		Yes	No
Gender	Male	66	66
	Female	125	74

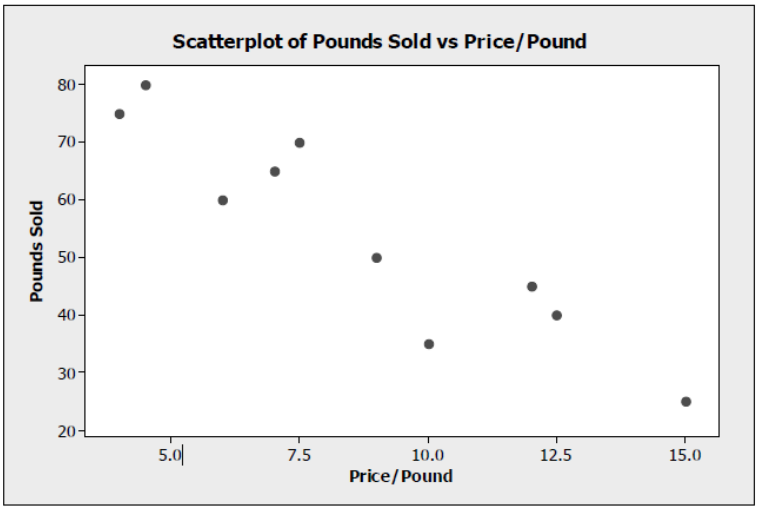
Test at 5% significant level, using χ^2 distribution, whether coupon redemption is independent of gender.

(9 marks)

(b) A small independent organic food store offers a variety of specialty coffees. To determine whether price has an impact on sales, the managers kept track of how many pounds of each variety of coffee were sold last month. The data, scatterplot, and summary statistics are shown below.

PRICE PER POUND ($)	**POUNDS SOLD**
3.99	75
5.99	60
7	65
12	45
4.5	80
7.5	70
15	25
10	35
12.5	40
8.99	50

Mean	8.75	54.50
Standard Deviation	3.63	18.33



(i) Comment on whether each of the following conditions for correlation/linear regression is met.

(a) Quantitative variable condition.
(b) Linearity condition.
(c) Outlier condition. (3 marks)

(ii) Estimate the linear regression model that relates the response variable (*monthly sales)* to the predictor variable (*price per pound*). (5 marks)

(iii) Using the estimated regression equation, estimate the monthly sales for a variety of coffee that costs $12 per pound. Comment on the reliability of the prediction. (2 marks)

(c) A company buys two products as follows.

	P_0	Q_0	P_n	Q_n
Product	Price	Quantity	Price	Quantity
	2019	2019	2020	2020
A	60	45	65	50
B	75	40	70	55

Using 2019 as the base year, calculate the

(i) Current year weighted price index for the product bought in 2020. (3 marks)

(ii) Laspeyres weighted quantity index for the product bought in 2020. (3 marks)

(Total: 20 marks)

~The End~

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