

FINAL
Examination Paper

(COVER PAGE)

Session : August 2016

Programme : Diploma in Business (DIB)
Diploma in Information and Communication Technology (DICTN)
Diploma in Finance (DIF)

Course : **STA1101: Quantitative Methods**

Date of Examination : 06 December, 2016 (Tuesday)

Time : 5:00pm – 7:00pm Reading Time : Nil

Duration : 2 Hours

Special Instructions :

Answer any **FOUR (4)** questions.

Materials permitted : Non-Programmable Calculator

Materials provided : Formula Booklet 2 and Graph Paper

Examiner(s) : **Angeline Tan**, Dinesh Kumar Govindasamy, Nor Aliza Mokhtar,
S.M.Elizabeth Rani Allappan and Bark Chee Beng

Moderator : Dr.Ng Set Foong

This paper consists of 8 printed pages, including the cover page

DIPLOMA IN BUSINESS PROGRAMME (DIB)
 DIPLOMA IN INFORMATION AND COMMUNICATION TECHNOLOGY PROGRAMME
 (DICTN)
 DIPLOMA IN FINANCE PROGRAMME (DIF)
 STA1101: QUANTITATIVE METHODS
 FINAL EXAMINATION: AUGUST 2016 SESSION

Instruction: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

- (a) The distribution of the scores of a sample of 100 students taking their Statistics examination is given in the following table.

Scores	Number of students
30 – 39	5
40 – 49	9
50 – 59	24
60 – 69	35
70 – 79	18
80 – 89	6
90 – 99	3

Calculate the

- (i) mean, (2 marks)
- (ii) mode, (3 marks)
- (iii) range, (1 mark)
- (iv) variance and standard deviation. (5 marks)

Construct a cumulative frequency curve (ogive) in a graph paper.

(4 marks)

From the cumulative frequency curve, estimate

- (v) median, (2 marks)
- (vi) the passing score, k , if 75% of the students pass the Statistics examination. (3 marks)

- (b) It is given that A and B are two events with $P(A) = 0.25$ and $P(B) = 0.54$.
If $P(\bar{A} \cap B) = 0.35$, calculate

(i) $P(A \cap B)$

(2 marks)

(ii) $P(\bar{B}|\bar{A})$

(3 marks)

(Total: 25 marks)

Question 2

- (a) The probability that Brian will enroll for the enrichment program in Statistics is 0.66. If Brian enrolls for the program, the probability that he will score A in Statistics is 0.75. If Brian does not enroll for the enrichment program, the probability that he will score A in Statistics is one third of the probability that he does enroll.

- (i) Draw a tree diagram to illustrate the above information.

(4 marks)

- (ii) Find the probability that Brian will score A in Statistics.

(2 marks)

- (iii) Find the probability that Brian actually enrolls for the enrichment program given that he scores A in Statistics.

(4 marks)

- (b) The table below shows the probability distribution of a discrete random variable, X .

x	0	1	2	3	4	5	6
$P(X=x)$	0.1	0.3	0.2	0.2	0.05	a	0.08

- (i) Find the value of a .

(2 marks)

- (ii) Calculate the mean and variance of X .

(4 marks)

- (iii) Find $\text{VAR}(-2X-2)$.

(2 marks)

- (iv) Calculate $P(2 \leq X < 5)$.

(2 marks)

- (c) The following table gives a two-way classifications of 400 workers selected from Kuala Lumpur.

	Covered by health insurance	Not covered by health insurance
Men	220	55
Women	85	40

If a worker is randomly selected from this group, compute the probability that this worker is

- (i) a woman or covered by health insurance (2 marks)
- (ii) a man, given he is not covered by health insurance (3 marks)

(Total: 25 marks)

Question 3

- (a) A box contains 40 spark plugs, of which 8 are substandard. If three plugs are selected from the box with replacement, what is the probability that three of them will be substandard? (2 marks)
- (b) Flaws occur randomly in a roll of fabric that produced by a manufacturer are known to follow a Poisson distribution with an average rate of 2.0 per meter length.
- (i) Find the probability that there are no flaws in a randomly chosen one-meter length of fabric. (2 marks)
- (ii) Find the probability that there are more than two flaws in a randomly chosen two-meter length of fabric. (4 marks)
- (c) The thickness of a shortbread biscuits produced in a factory is known to be normally distributed with a mean of 15 mm and a standard deviation of 1.6 mm. A biscuit is randomly selected. Find
- (i) the probability that the thickness of the chosen biscuit is more than 16 mm (2 marks)
- (ii) the probability that the thickness of the chosen biscuit is between 14 mm and 17 mm (4 marks)
- (iii) the value of k if 20% of the biscuits have thickness more than k mm (5 marks)
- (d) In a production line, the manager wishes to estimate p , the proportion of defective items. Suppose that a sample of 200 units is randomly selected and 10 units are found defective. Compute the point estimate for p and also the 90% confidence interval for p . (6 marks)

(Total: 25 marks)

Question 4

- (a) A sample of students who scored well in a Statistics class was polled regarding the number of hours they spent studying for the final examination. The data are shown below:

21	7.5	9	8	8	22	12	11.5	13	22
14	10.5	20	6	23	8.5	13	7	6.5	8.5

- (i) Find the point estimate of the population mean (1 mark)
- (ii) Find the standard deviation (3 marks)
- (iii) Using the 95% level of confidence, determine the confidence interval for the population mean (4 marks)
- (b) Suppose that we want to test the hypothesis with a significance level of 0.05 that the climate has changed since industrialization. Suppose that the mean temperature throughout history is $50^{\circ}F$. During the last 40 years, the mean temperature has been $51^{\circ}F$ and suppose the population standard deviation is $2^{\circ}F$. Can we conclude that the mean temperature is different from $50^{\circ}F$? (7 marks)
- (c) A study was conducted to investigate the effectiveness of hypnotism in reducing pain. Results for randomly selected subjects are shown in the following table. The “before” value is matched to an “after” value.

Subject:	A	B	C	D	E	F	G	H
Before	6.6	6.5	9.0	10.3	11.3	8.1	6.3	11.6
After	6.8	2.4	7.4	8.5	8.1	6.1	3.4	2.0

Are the sensory measurements, on average, lower after hypnotism? Test at 5% significance level.

(10 marks)

(Total: 25 marks)

Question 5

- (a) The time, in minutes, taken by candidates in completing an external examination has a normal distribution. A random sample of 100 candidates is selected and the time x taken in completing the examination is recorded. The results are summarized as follow:

$$\sum x = 9000 \qquad \sum x^2 = 832000$$

- (i) Calculate the unbiased estimate for the population mean, μ and the population variance, σ^2 .
(2 marks)
- (ii) If 15 candidates of the 100 candidates who sat for the examination did not complete the examination, calculate 90% confidence interval for the population proportion of candidates who completed the examination.
(4 marks)
- (b) The mean lasting time of 2 competing floor waxes is to be compared. Twenty floors are randomly assigned to test Wax 1; and twenty floors are randomly assigned to test Wax 2. The lasting time (in months) of the floor wax is summarized in the following table.

Wax	Sample Mean	Population Standard Deviation
1	3	0.33
2	2.9	0.36

Does the data indicate that Wax 1 is more effective than Wax 2? Test at 5% level of significance.

(9 marks)

- (c) A recent study on new cases of insulin-dependent diabetes in youth from age 14 to age 24 years was 1495. The following table shows the number of cases according to gender and age.

		Age (years)			Total
		14 - 17	18 - 21	22 - 24	
Gender	Male	205	248	328	781
	Female	182	251	281	714
Total		387	499	609	1495

By using χ^2 test, test at 5% significance level whether there is a dependency between the gender and age of the youth.

(10 marks)

(Total: 25 marks)

Question 6

- (a) The following data show the revenue and quantity of four items sold by a household store in Malaysia for the year 2014 and year 2015.

Item	2014 Quantity	2014 Revenue	2015 Quantity	2015 Revenue
A	45	1800	30	1750
B	50	6000	50	3750
C	22	900	16	1200
D	40	4720	25	3720

Using 2014 as the base year, calculate the

- (i) Laspeyeres Price Index. Interpret your answer. (4 marks)
- (ii) Paasche Quantity Index. Interpret your answer. (4 marks)
- (b) The following shows the relationship between percentage of body fat and age among 10 female adults.

Age	Body Fat (%)
23	24
26	12
37	18
39	25
44	31
49	28
50	22
52	40
53	33
60	40

- (i) Determine the dependent variable and independent variable. (2 marks)
- (ii) Plot a scatter diagram for the above data. (2 marks)
- (iii) Calculate the correlation coefficient and interpret your answer. (4 marks)
- (iv) Determine the regression line equation and draw the regression line on the scatter diagram. (5 marks)

(v) Determine the coefficient of determination and interpret your answer. (2 marks)

(vi) Predict the percentage of body fat for a female adult who is 55 years old. (2 marks)

(Total: 25 marks)

~ The End ~
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