



RESIT
Examination Paper

(COVER PAGE)

Session : January 2013

Programme : Diploma In Business (DIB)
Diploma In Information And Communication Technology (DICTN)

Course : **STA1101: QUANTITATIVE METHODS**

Date of Examination : March 8, 2013

Time : 11:00am – 1:00pm Reading Time: Nil

Duration : 2 Hours

Special Instructions :

Answer any **FOUR (4)** structured-type questions.

Materials permitted :
Non-programmable Calculator

Materials provided :
Graph paper

Examiner (s) : **Ms. Cetha Achutan Nair.**

Moderator : Mr. Tan Seng Kuan

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

INTI INTERNATIONAL COLLEGE SUBANG

DIPLOMA IN BUSINESS PROGRAMME (DIB)
 STA 1101 : QUANTITATIVE METHODS
 RESIT EXAMINATION : JANUARY 2013 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) Suppose scores on an IQ test are normally distributed. If the test has a mean of 100 and a standard deviation of 10, what is the probability that a person who takes the test will score between 90 and 110? (4 marks)
- (b) Use the standard normal distribution to find
- (i) $P(-2.25 < z < 0)$. (1 mark)
- (ii) $P(0.67 < z < 1.37)$ (2 marks)
- (c) The manager of a restaurant in a large city claims that waiters working in all restaurants in his city earn an average of \$150 or more in tips per week. A random sample of 25 waiters selected from restaurants of this city yielded a mean of \$139 in tips per week with a standard deviation of \$28. Assume that the weekly tips for all waiters in this city have a normal distribution. Using 1% significance level, can you conclude that the manager's claim is true? (6 marks)
- (d) During a busy period at a railway station, trains arrive at an average rate of 5 per hour.
- i. What is the probability that at least 2 trains will arrive at the station during a given 30-minute period? (4 marks)
- ii. What are the mean and standard deviation for the arrivals of trains for every 3 hours? (4 marks)
- (e) According to a survey of 1506 children in a school, 75% do have proper breakfast in the morning. Find, with a 95% confidence level, the proportion of students who do have proper breakfast in the morning. (4 marks)

Question 2

- (a) A market researcher surveyed a sample of 50 listeners of Tracks FM radio station and obtained the following age distribution.

Age (years)	Frequency
10 - 15	4
15 - 20	10
20 - 25	16
25 - 30	10
30 - 35	6
35 - 40	4

- (i) Draw a histogram to represent the above data. (5 marks)
- (ii) Calculate the mean, median and standard deviation of the age of listeners. (11 marks)
- (b) Consider the following variables : number of students in a district, the name of a school, amount spent per pupil, and the mean salary of the teachers. Which of the variables are qualitative and which are quantitative? (4 marks)
- (c) The accounting firm of R&T Associates has five senior partners. Yesterday the senior partners saw six, four, three, seven, and five clients, respectively.
- (i) Compute the mean number and median number of clients seen by a partner. (4 marks)
- (ii) Is the mean a sample mean or a population mean? (1 mark)

Question 3

- (a) One end A of an elastic string was attached to a horizontal bar and a mass, m grams was attached to the other end B. The mass was suspended freely and allowed to settle vertically below A. The length AB, l mm, was recorded, for various masses as follows.

m	100	200	300	400	500	600
l	228	236	256	278	285	301

- (i) Calculate the least square line of regression of l on m . (6 marks)
- (ii) Interpret the slope for part (a). (2 marks)
- (iii) Estimate the length of the string when a mass of 360 grams is attached at B. (2 marks)
- (b) The events A and B are mutually exclusive. Suppose $P(A) = 0.30$ and $P(B) = 0.20$.
- (i) What is the probability of either A or B occurring? (2 marks)
- (ii) What is the probability that neither A nor B will happen? (2 marks)
- (c) A recent study by the AHP Association revealed that 60 percent of American drivers use their seat belts. A sample of 10 drivers is selected.
- (i) What is the probability that exactly 7 are wearing seat belts? (3 marks)
- (ii) What is the probability that 7 or fewer of the drivers are wearing seat belts? (4 marks)
- (iii) Compute the mean and standard deviation of this probability distribution. (4 marks)

Question 4

- (a) A researcher wishes to estimate the average amount of money a person spends on lottery tickets each month. A sample of 50 people who play lottery found the mean to be \$19 and the standard deviation to be 6.8. Find the best point estimate of the population mean and the 95% confidence interval of the population mean. (7 marks)
- (b) A normal population has a mean of 60 and a standard deviation of 12. A random sample of 9 is selected. Compute the probability that the sample mean is
- (i) Greater than 63. (3 marks)
- (ii) Between 56 and 63 (4 marks)
- (c) Using historical records, the personnel manager of a plant has determined the probability distribution of X , the number of employees absent per day. It is

x	0	1	2	3	4	5
$P(x)$	0.05	0.31	0.22	0.34	0.06	0.02

- a) Find the following probabilities.
- (i) $P(2 \leq X \leq 5)$ (2 marks)
- (ii) $P(X < 4)$ (2 marks)
- b) Calculate the mean of X . (2 marks)
- c) Calculate the standard deviation of X . (5 marks)

Question 5

- (a) In one region, the September energy consumption levels for single-family homes are found to be normally distributed with a mean of 1050 kWh and a standard deviation of 218 kWh. For a randomly selected home, find the probability that the September energy consumption level is between 1100 kWh and 1225 kWh. (4 marks)

- (b) Suppose that an unbiased die is tossed 120 times and each outcome is recorded in the following frequency table.

Number that appears	1	2	3	4	5	6	Total
Total frequency	20	10	10	20	20	40	120

Test whether the toss of the die is bias or not. (10 marks)

- (c) An experiment is performed to determine whether the average nicotine content of a kind of cigarette exceeds that of another kind. If $n_1 = 50$ cigarettes of the first kind had an average of $\bar{X}_1 = 2.61$ milligram with a standard deviation of $s_1 = 0.12$ milligram. The other kind with $n_2 = 40$ cigarettes had an average nicotine content of $\bar{X}_2 = 2.38$ with a standard deviation of $s_2 = 0.14$ milligram. Take α as 0.05.
- (i) Formulate the appropriate null and alternate hypotheses. (2 marks)
- (ii) Is the test right-tailed, left-tailed or two-tailed? (1 mark)
- (iii) Calculate the test statistics for the test. (3 marks)
- (iv) Interpret your decision. (2 marks)
- (d) Determine the value c so that the following function can serve as a probability distribution of the discrete random variable X :

$$f(x) = c(x^2 + 4), \text{ for } x = 0, 1, 2, 3 \quad (3 \text{ marks})$$

Question 6

- (a) A Pew Research poll was conducted to investigate opinions about global warming. The respondents who answered yes when asked if there is solid evidence that the earth is getting warmer were then asked to select a cause of global warming. The results are given in the table below. Use a 0.05 significance level to test the claim that the sex of the respondent is independent of the choice for the cause of global warming.

	Human activity	Natural patterns	Don't know
Male	308	152	40
Female	314	146	40

(10 marks)

- (b) In a preliminary study to determine whether the installation of a camera designed to catch cars that go through red lights affects the number of violators, the number of red-light runners was recorded for each day of the week before and after the camera was installed. These data are listed here.
Can we infer that the camera reduces the number of red-light runners?
Test at $\alpha = 5\%$. These data are listed here

Day	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Before	11	16	31	18	20	24	16
After	8	22	24	19	16	19	15

(11 marks)

- (c) The following table shows the vegetable prices and quantity sold by a wholesaler in 2009 and 2010.

	Price /kg (RM)		Quantity (kg)	
	2009	2010	2009	2010
Cauliflower	2.50	2.60	2000	2500
Pumpkin	2.00	2.20	1000	1200

Calculate a Laspeyres price index that shows the change in prices between year 2009 and 2010. (Use 2009 as the base year) (4 marks)