NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

BACHELOR OF COMMERCE (HONOURS) DEGREE

QUANTITATIVE ANALYSIS FOR BUSINESS CIN 1207
SUPPLEMENTARY EXAM

JULY 2005 **DURATION: 3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. Answer all questions in Section A
2. Choose and answer five(5) out of six(6) questions in Section B
3. Graph paper will be provided on request
4. Statistical tables will be provided
5. You may use a non-programmable Scientific Calculator

SECTION A (ANSWER ALL QUESTIONS) [40 MARKS]

QUESTION ONE

a) The rate of inflation in Zimbania over the last five years was 13%; 18%; 20%; 30%; 40%. Find the average rate of inflation in Zimbania over the five year period.

[3marks]

b) A company proposes to sell 50Kg of Copper at $40 per Kg and 60 Kg Silicon at $50 per Kg. Calculate the price per Kg for a combined package.

[4 marks]

c) In the state lotteries, how many 6-digit numbers can be formed from the 10 digits 0-9, if repetitions are allowed? **[2 marks]**

d) List:

i) Three (3) methods of data collection. **[3 marks]**

ii) Three (3) methods of sampling. **[3 marks]**

e) A fair die is rolled once. What is the probability that it turns in a value which is at most 4? **[2 marks]**

f) A pair of fair dice is rolled once. What is the probability that the sum on the dice is:

i) an even number? **[3marks]**

ii) at least 3? **[4 marks]**

g) A motorist travels at 150 km/h over a 50 km stretch of road, and 130km/h over another hilly 50 km portion. Find the motorist's overall average speed over the entire journey? **[4 marks]**

h) How many different sums of money can be obtained by choosing two coins from a box containing a 5 cent coin, a 10 cent coin, a 20 cent coin, a 50 cent coin and a $1 coin? **[2 marks]**

i) How many arrangements can we make from the letters of the word "Mississippi?" **[2 marks]**

j) Define the terms:

i) Conditional probability.
ii) Dependent events.
iii) Inclusive events.
iv) Discrete data. **[8 marks]**

Total [40 marks]

SECTION B: CHOOSE AND ANSWER 5 OUT OF 6 QUESTIONS

ALL QUESTIONS CARRY EQUAL MARKS

QUESTION TWO

A real estate company specializing in sales of farms would like to know if their sales can be predicted based on the number of years of experience of their salespersons. A random sample of sales is taken for 10 salespeople having years of experience ranging from 1 to 10 years and is given below:

Years of experience	1	2	3	4	5	6	7	8	9	10
Number of sales	3	2	5	4	6	8	9	9	12	10

i) Plot the scatter graph for the data. **[4 marks]**
ii) Find the sample regression equation using the Least Squares method. **[6 marks]**

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iii) Predict sales for someone with 15 years experience, from the Least Squares equation. **[3 marks]**
iv) Compute the co-efficient of determination and comment. **[7 marks]**

Total [20 marks]

QUESTION THREE

Firm	**DEFECTIVE TUBES PER BOX OF 100 UNITS**				
	0	**1**	**2**	**3 or more**	**Total**
Supplier A	500	200	200	100	**1 000**
Supplier B	320	160	80	40	**600**
Supplier C	600	100	50	50	**800**
Total	**1 420**	**460**	**330**	**190**	**24 00**

i) If one box had been selected at random from this universe, what are the probabilities that the box would have come from supplier A? Supplier B?
[2 marks, 2marks]

ii) If a box was selected at random, what is the probability that it would contain two defective tubes? **[4 marks]**

iii) If a box came from supplier A, what is the probability that the box would have 2 or less defectives?

iv) It is known that a box selected at random has two defective tubes, what is the probability that it came from supplier A? from suppler B? from supplier C?
[**4 marks, 4marks,4marks]**

Total [20 marks]

QUESTION FOUR

The following figures relate to credit reports prepared by a credit reporting agency for 100 business days:

60	43	64	58	52	52	67	59	60	51
62	56	63	61	68	57	51	59	47	42
64	43	67	52	58	47	59	64	58	52
63	48	65	60	61	59	63	56	62	56
62	57	59	62	56	63	55	73	60	69
53	66	54	52	54	61	55	65	55	61
59	74	62	49	63	63	53	71	59	46
64	41	60	51	55	64	46	64	56	59
49	64	60	57	58	66	53	65	62	58
65	61	50	55	57	61	45	43	60	66

i) Construct a frequency distribution table starting at 40, using an interval width of 5. **[6 marks]**

ii) From the grouped frequency distribution in i) above, calculate the
a) mean. **[4 marks]**
b) median. **[5 marks]**
c) mode **[5 marks]**

Total [20 marks]

QUESTION FIVE

The local chamber of commerce has commissioned some market research into the spending habits of the local adult population. A random sample of 500 adults has been selected as follows:

Age group (years)	Number in sample
18-<21	54
21-<30	63
30-<45	167
45-<60	85
60 and over	131

Total **500**

From Government census statistics, it is known that the local adult population has the following distribution:

Age group (years)	**% of population**
18-<21	13
21-<30	12
30-<45	38
45-<60	15
60 and over	22

What comment can you make about the age profile of the selected sample compared to that of the population (Carry out a Chi-squared test using $\alpha = 5\%$).

Total [20 marks]

QUESTION SIX

a) A foreman is concerned about the amount of time that workers spend in the rest- room. A random sample of 12 workers in one day gave the following times in minutes: 3;5;4;3;2;4;4;1;3;3;5;5;. Give the 95% prediction interval. **[5 marks]**

b) 400 zippers are inspected and 74 are found to be defective. Give the 99% confidence interval estimate of the population proportion of defective zippers. **[5 marks]**

c) A sample of 150 light bulbs of type A gave a mean life of 1400 hours and a standard deviation of 120 hours. Another sample of 200 light bulbs of type B gave a mean life of 1200 hours and a standard deviation of 80 hours. Determine a 95% confidence interval for the difference between the mean life spans of the two types of light bulbs. **[10 marks]**

Total [20 marks]

QUESTION SEVEN

a) In a survey of pig farms it is suspected that the occurrence of a particular disease may be associated with the method of feeding. Methods of feeding are grouped into two categories, A and B. Of 27 farms on which the disease occurred, 16 used method A and of 173 farms on which the disease had not occurred, 84 used method A. Test using the 5% level of significance, for independence between the method of feeding and occurrence of disease. **[10 marks]**

A sample length of material was cut from each of five randomly selected rolls of cloth and each length divided into two halves. One half was dyed with a newly developed dye and the other half with a dye that had been in use for some time. The ten pieces were then washed and the amount of dye washed out was recorded for each piece as follows:-

Roll	**1**	**2**	**3**	**4**	**5**
Old dye	13.2	13.7	15.4	13.5	16.8
New dye	12.5	14.3	16.8	14.9	17.7

Investigate the allegation that the amount of dye washed out for the old dye is significantly less than for the new dye (use $\alpha=0.05$)

[10 marks]
Total [20 marks]

*****END OF EXAMINATION*****