BACHELOR OF COMMERCE (HONOURS) DEGREE

QUANTITATIVE ANALYSIS FOR BUSINESS II CIN 1207

April/May 2001 Final Examination **Duration: 3 Hours**

Instructions to Candidates

1. Answer all questions in Section A
2. Choose and answer three (3) out of five (5) questions in Section B.
3. Answer both questions in Section C
4. Graph Paper will be provided
5. You may use a Non-Programmable Scientific Calculator

SECTION A

ANSWER ALL QUESTIONS

Question 1

(a) Assume that the sales made by a used car salesman occur like events in a Poisson process with $\lambda = 1$ per week.

What is the probability he makes exactly 3 sales in a two-week period?

[4 Marks]

(b) Given a box with 2 25-watt, 3 4-watt and 4 100-watt bulbs, in how many ways could 3 bulbs be selected from the box?

[2 Marks]

(c) Suppose your doctor recommends that you go on a particular diet for 2 weeks. Considering your build and bone structure, he assumes that the amount of weight You will lose is equally likely to lie between 5 and 10kgs. What is the average amount you might expect to lose on such a diet, given that X is the number of kgs you will lose and

$$\begin{cases} f_x(x) = \frac{1}{5} & 5 < x < 10 \\ = 0 & \text{otherwise} \end{cases}$$

[5 Marks]

(d) A student takes a multiple-choice exam which contains 8 questions, each with 3 alternative answers. Assume that he is guessing when answering each question. Then the probability that he answers a question correctly is $\frac{1}{3}$ for each question. What is the probability that he misses them all?

[5 Marks]

(e) In a Q.A.B. Exam a sample of 30 marks yields a mean mark of 60 and a Standard Deviation of 15. Give a 95% Confidence Interval Estimate of the population mean, μ.

[5 Marks]

(f) Graduate:

(i) $8p_2$ (ii) $^{10}C_3$

[4 Marks]

(g) A manufacturing representative is considering the option of taking out an insurance policy to cover possible losses incurred in marketing a new product. If the product is a complete failure, the representative feels that a loss of 60 000 would be incurred; if it is only moderately successful, a loss of 20 000 would be incurred. Insurance Actuaries have determined from market surveys and other available information that the probabilities that the product will be a failure or only moderately successful one 0.01 and 0.05 respectively.

Assuming that the manufacturing representative would be willing to ignore all other possible losses, what premium should the Insurance company charge for he policy in order to break even?

[10 Marks]

(h) Define the terms:

(i) Median (ii) Mode (iii) Percentile

(iv) Skewness (v) Kurtosis

[5 Marks]
[Total Marks:40]

SECTION B

CHOOSE AND ANSWER 3 OUT OF 5 QUESTIONS

Question 2

(a) A researcher suspects there is a correlation between the number of promises a political candidate makes and the number of promises that are fulfilled once the

candidate is elected. He keeps track of several prominent politicians and records the following data:

Promises made	X	20	30	30	40	50	50	60
Promises kept	Y	7	6	5	4	3	2	1

(i) Find the Correlation Coefficient and interpret it.

(ii) Do the findings suggest a 'Causal effect' relationship or otherwise? (i.e. Do the findings suggest that the number of promises made induces or causes a certain number of promises to be kept?)

[10 Marks]

(b) You wish to establish whether or not there is a Linear Relationship between obesity and Food Consumption. For a sample of 12 people, you have the following pair of figures observed over a period of time.

X	32	33	33	24	39	32	34	28	33	27	26	29
Y	85	95	80	60	95	85	90	80	85	70	65	75

Complete the appropriate Least Squares Equation ad interpret the Regression Coefficient.

[10 Marks]

Question 3

The following set of data collected from the Department of health Services gives the percentage of impurities in water samples collected form reservoirs.

22	8	15	CA Put !'	13	23	23	9	5	13
20	17	11	11	13	17	11	10	21	7
17	26	17	23	14	24	21	17	13	16
15	21	21	20	10	26	13	11	15	15

(a) Prepare a grouped frequency table starting with 5-9; 10-14; etc.

[4 Marks]

(b) Draw the Histogram of the data and superimpose a frequency Polygon.

[10 Marks]

(c) Calculate:

(i) mean **[2 Marks]**

(ii) median **[2 Marks]**

(iii) mode **[2 Marks]**

[Total Marks:20]

Question 4

The following table is taken form Greenwood and Yule's data for typhoid:

	Observed		
	Attached	**Not Attached**	**Total**
Inoculated	56	6.76	6.83
Not inoculated	272	11.4	11.68
Total	328	18.16	18.48

Can we conclude whether or not the results above are from Independent Variables?

[Total Marks:20]

Question 5

Twenty cars from two comparable major brand models are selected at random. These 40 cars are subjected to accelerated life testing (they are driven many kilometres over very poor roads in a short time) and their failure times are recorded in weeks: using groupings of 16-23; 24-28; 29-34; 35-44; determine whether the two brands of cars have equal distributions for the length of their lives under accelerated life testing.

Brand	U	25	31	20	42	39	CA Put !'	35	36	44	26
		38	31	29	41	43	36	28	31	25	38
Brand	V	28	17	33	25	31	21	16	CAP ut!'	31	27
		23	CA Put !'	25	22	29	32	24	20	34	26

HINT: Tabulate as follows:
Groups (Failure intervals)

	16-23	24-28	29-34	35-44	Total
Brand U	2	4	4	10	20
Brand V	8	6	6	0	20
	10	10	10	10	40

[Total Marks:20]

Question 6

The following is a Time Series of Expenditure form 1973 to 1980

	Quarter			
Year	**1**	**2**	**3**	**4**
1973	7.8	9.16	9.62	11.43
1974	9.49	11.27	11.62	13.63
1975	10.84	12.15	11.67	13.3
1976	10.96	12.66	13.48	15.38
1977	12.52	14.84	15.6	17.19
1978	13.67	16.76	16.89	20.3
1979	15.88	19.02	20.11	23.84
1980	19	22.14		

Compute the Seasonal Indexes and use them to de-seasonalise the Time Series.

[Total Marks:20]

TURN OVER

SECTION C

COMPULSORY ANSWER BOTH QUESTIONS

Question 7

The number of detective electrical fuses proceeding from each of two production lines, $A \alpha B$, was recorded daily for a period of ten days, with the following results:

	Production	
Day	**A**	**B**
1	170	201
2	164	179
3	140	159
4	184	195
5	174	177

6	142	170
7	191	183
8	169	179
9	161	170
10	200	212

Assume that both production lines produced the same daily output. Compare the number X_A of defectives produced each day by production line A with the number X_B, produced by production line B and let X equal the number of days when X_A exceeded X_B. Do the data present sufficient evidence at the 5% significance level, that one production line tends to produce more defectives tan the other or, equivalently, that $P(X_A > X_B) \neq \frac{1}{2.}$

State the appropriate hypothesis and test it.

[Total Marks:20]

Question 8

You are the president of a company that makes wrist watches. The prestige line of watches, Chronomatrux 1536 is water proof, stock proof, dust proof, and features anti-magnetic movement. This watch is sold to distributors at 25 a piece. Your vice-president suggest that a guarantee to replace watches that fail within two years of purchase would allow a price increase of $2.00 per watch without a decrease in demand.

The engineering department assures you that the life times of the Chronomatrix 1536 follow some unknown probability distribution with mean $\mu = 3.5$ years and $\sigma = 0.5$ years. If sales remain constant at 100 000 watches per year and a replacement watch would cost $15, 00 is this a profitable policy for your company?

[Hint: use Chebychev's Theorem since the probability distribution is unknown]

[Total Marks 20]

END OF EXAMINATION!