

THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF MANAGEMENT STUDIES DEGREE PROGRAMME
LEVEL 5 – 2006/2007



FINAL EXAMINATION 2007

QUANTITATIVE TECHNIQUES FOR MANAGEMENT II – MCU 3209

DURATION : THREE (03) HOURS.

DATE : 18th February 2007

TIME: 1.30 p.m. – 4.30 p.m.

INSTRUCTIONS

This paper contains seven (07) questions.

Answer any five (05) questions.

All questions carry equal marks.

Standard Normal and Chi-square tables are annexed herewith.

Non-programmable calculators are allowed.

01. a) Explain how a Normal distribution is transformed to a Standard Normal distribution.
- What are the reasons for transforming a Normal Distribution to a Standard Normal Distribution?
- b) Two students sat for the BMS selection test and the raw marks scored were 63 and 93 (out of hundred). Their corresponding 'Z' scores are -1 and 1.5 respectively.
- i. Compute the mean and standard deviation of marks.
 - ii. What is the median mark of the examination?
02. a) i. What probability model is most suitable to describe a situation where 50 misprints are randomly distributed throughout a 100 page book? Why?
- ii. State the probability distribution for the above situation.
 - iii. Using the model stated above what is the probability that a page observed will have at least one mistake.

- b) The following table gives the number of defects found in a manufacturing process in a 50 day period.

No. of defects	0	1	2	3	4
No. of days	21	18	7	3	1

- i. What is the mean number of defects?
 - ii. Assuming the data are in a Poisson model, construct a Poisson distribution.
 - iii. Fit a Poisson distribution to the above data.
03. a) State the conditions a Binomial Distribution will tend to be a Normal Distribution.
- b) The Open University has 15 telephone lines. It was observed that on average one line out of these 15 lines is busy between 3 p.m. and 4 p.m. What is the probability that if six lines are selected randomly,

i. not more than three lines will be busy?

ii. at least three of them will be busy?

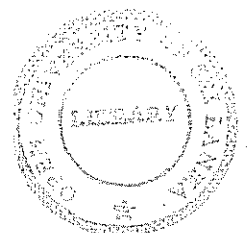
- c) In a certain restaurant the probability of a customer spending more than Rs.2000/- is 0.4. On a day 200 customers are expected.

What is the probability that at least 80% of the customers spend more than Rs.2000/- on a day?

04. a) Explain the relationship between sample size and sampling error.

b) A factory uses an automated filling machine to bottle a soft drink in containers of 1000ml. A sample of 100 is observed and found the mean and standard deviation of the sample are 1002 ml and 2ml respectively. Develop a 95% confidence interval estimate for the fillings of the bottles.

c) After servicing the above machine; another sample of 100 bottles were examined and found the mean fill of a bottle is 1000ml. Assuming the variance is unaltered, is there evidence that at a 5% level of significance the machine setting has changed.



05. a) Explain the importance of Chi-Square Test for business organizations.

b) A newspaper company had done a survey to find the customer response to a certain supplementary issued with their Sunday news paper. The results are as follows.

	Age group (yrs.)			
	Below 25	Between 25-50	above 50	Total
Persons who liked the Supplementary	45	30	25	100
Do liked the supplementary	55	20	25	100

(Source: Survey data)

Can we conclude that the appeal to supplementary is independent of age group? Give reasons for your answer.

06. a) Distinguish between correlation and regression analysis . What are their role in business? Explain.

b) The following marks given out of hundred are obtained by a group of students followed Quantitative Techniques for Management.

Assignment Test (a)	80	40	50	60	64	52	56	82
Final Exam (b)	75	46	52	58	62	48	55	80

$$\sum(a) = 484$$

$$\sum(b) = 476$$

$$\sum(ab) = 30024$$

$$\sum(a^2) = 30760$$

$$\sum(b^2) = 29382$$

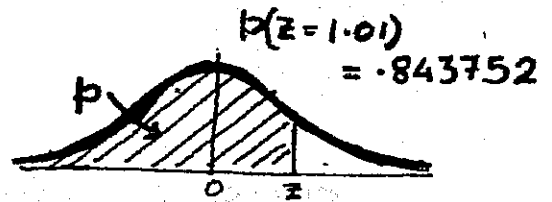
- i. Calculate the coefficient of correlation.
- ii. Express your view on the relationship between the test marks.
- iii. Construct the line of regression to forecast the final exam marks based on the students assignment test marks.
- iv. Estimate the final exam marks of a candidate who scored 70 marks at the assignment test.
State the key assumptions used.

07. Write short notes on any four of the following.

- a) Components of time series data
- b) Applications of product moment and Rank correlations.
- c) Permutations and combinations.
- d) Random and non random sampling techniques.
- e) Type I and type II error.

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Standard normal distribution



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.500000	.503989	.507978	.511966	.515953	.519939	.523922	.527903	.531881	.535856
0.1	.539828	.543795	.547758	.551717	.555670	.559618	.563559	.567495	.571424	.575345
0.2	.579260	.583166	.587064	.590954	.594835	.598706	.602568	.606420	.610261	.614092
0.3	.617911	.621720	.625516	.629300	.633072	.636831	.640576	.644309	.648027	.651732
0.4	.655422	.659097	.662757	.666402	.670031	.673645	.677242	.680822	.684386	.687933
0.5	.691462	.694974	.698468	.701944	.705401	.708840	.712260	.715661	.719043	.722405
0.6	.725747	.729069	.732371	.735653	.738914	.742154	.745373	.748571	.751748	.754903
0.7	.758036	.761148	.764238	.767305	.770350	.773373	.776373	.779350	.782305	.785236
0.8	.788145	.791035	.793892	.796731	.799546	.802337	.805105	.807850	.810570	.813267
0.9	.815940	.818589	.821214	.823814	.826391	.828944	.831472	.833977	.836457	.838913
1.0	.841345	.843752	.846136	.848495	.850830	.853141	.855428	.857690	.859929	.862143
1.1	.864334	.866500	.868643	.870762	.872857	.874928	.876976	.879000	.881000	.882977
1.2	.884930	.886861	.888768	.890651	.892512	.894350	.896165	.897958	.899727	.901475
1.3	.903200	.904902	.906582	.908241	.909877	.911492	.913085	.914657	.916207	.917736
1.4	.919243	.920730	.922196	.923641	.925066	.926471	.927855	.929219	.930563	.931888
1.5	.933193	.934478	.935745	.936992	.938220	.939429	.940620	.941792	.942947	.944083
1.6	.945201	.946301	.947384	.948449	.949497	.950529	.951543	.952540	.953521	.954486
1.7	.955435	.956367	.957284	.958185	.959070	.959941	.960796	.961636	.962462	.963275
1.8	.964070	.964852	.965620	.966375	.967116	.967843	.968557	.969258	.969946	.970621
1.9	.971283	.971933	.972571	.973197	.973810	.974412	.975002	.975581	.976148	.976705
2.0	.977250	.977784	.978308	.978822	.979325	.979818	.980301	.980774	.981237	.981691
2.1	.982136	.982571	.982997	.983414	.983823	.984222	.984614	.984997	.985371	.985738
2.2	.986097	.986447	.986791	.987126	.987455	.987776	.988089	.988396	.988696	.988989
2.3	.989276	.989556	.989830	.990097	.990358	.990613	.990863	.991106	.991344	.991576
2.4	.991802	.992024	.992240	.992451	.992656	.992857	.993053	.993244	.993431	.993613
2.5	.993790	.993963	.994132	.994297	.994457	.994614	.994766	.994915	.995060	.995201
2.6	.995339	.995473	.995604	.995731	.995855	.995975	.996093	.996207	.996319	.996427
2.7	.996533	.996636	.996736	.996833	.996928	.997020	.997110	.997197	.997282	.997365
2.8	.997445	.997523	.997599	.997673	.997744	.997814	.997882	.997948	.998012	.998074
2.9	.998134	.998193	.998250	.998305	.998359	.998411	.998462	.998511	.998559	.998605

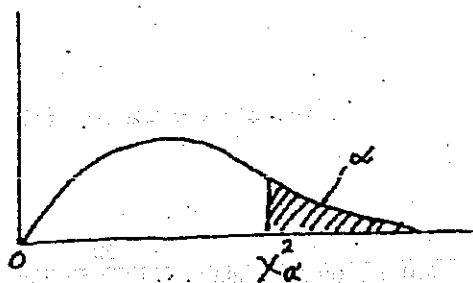
Some useful formula (in familiar notation)

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left(\sum x^2 - \frac{(\sum x)^2}{n}\right) \left(\sum y^2 - \frac{(\sum y)^2}{n}\right)}}$$

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}, \quad a = \bar{y} - b\bar{x}$$

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Chi-Square Table:
Values of χ^2_α



$\chi^2_{.10}$	$\chi^2_{.05}$	$\chi^2_{.025}$	$\chi^2_{.01}$	$\chi^2_{.005}$	df
2.70554	3.84146	5.02389	6.63490	7.87944	1
4.60517	5.99147	7.37776	9.21034	10.5966	2
6.25139	7.81473	9.34840	11.3449	12.8381	3
7.77944	9.48773	11.1433	13.2767	14.8602	4
9.23635	11.0705	12.8325	15.0863	16.7496	5
10.6446	12.5916	14.4494	16.8119	18.5476	6
12.0170	14.0671	16.0128	18.4753	20.2777	7
13.3616	15.5073	17.5346	20.0902	21.9550	8
14.6837	16.9190	19.0228	21.6660	23.5893	9
15.9871	18.3070	20.4831	23.2093	25.1882	10
17.2750	19.6751	21.9200	24.7250	26.7569	11
18.5494	21.0261	23.3367	26.2170	28.2995	12
19.8119	22.3621	24.7356	27.6883	29.8194	13
21.0642	23.6848	26.1190	29.1413	31.3193	14
22.3072	24.9958	27.4884	30.5779	32.8013	15
23.5418	26.2962	28.8454	31.9999	34.2672	16
24.7690	27.5871	30.1910	33.4087	35.7185	17
25.9894	28.8693	31.5264	34.8053	37.1564	18
27.2036	30.1435	32.8523	36.1908	38.5822	19
28.4120	31.4104	34.1696	37.5662	39.9968	20
29.6151	32.6705	35.4789	38.9321	41.4010	21
30.8133	33.9244	36.7807	40.2894	42.7956	22
32.0069	35.1725	38.0757	41.6384	44.1813	23
33.1963	36.4151	39.3641	42.9798	45.5585	24
34.3816	37.6525	40.6465	44.3141	46.9278	25
35.5631	38.8852	41.9232	45.6417	48.2899	26
36.7412	40.1133	43.1944	46.9630	49.6449	27
37.9159	41.3372	44.4607	48.2782	50.9933	28
39.0875	42.5569	45.7222	49.5879	52.3356	29
40.2560	43.7729	46.9792	50.8922	53.6720	30
51.8050	55.7585	59.3417	63.6907	66.7659	40
63.1671	67.5048	71.4202	76.1539	79.4900	50
74.3970	79.0819	83.2976	88.3794	91.9517	60
85.5271	90.5312	95.0231	100.425	104.215	70
96.5782	101.879	106.629	112.329	116.321	80
107.565	113.145	118.136	124.116	128.299	90
118.498	124.342	129.561	135.807	140.169	100