University of Kelaniya – Sri Lanka

External Examinations Branch

Faculty of Commerce and Management

Bachelor of Business Management (General) Degree Second Examination – (External) 2009

October 2010

BMGT E 2045 – Statistics for Management

No of questions - 07 Time: 03 Hours

Answer any five (05) questions. Graphs papers will be provided.

(01) (a) What are the characteristics of statistics?

(b) "Statistics is not a subject which is limited to one specific field." State the advantages that other fields can obtain by using Statistics.

(c) "Though Statistics is being used by many disciplines, statistics is not a perfect subject."
Elaborate this statement.

(d) Explain the role of statistics in the field of in Business and Management.

(5 x 4 = 20 marks)

(02) (a) The following table shows how a normal family and the family A spend their income on several items

Item of expenditure	Normal family	Family A
Milk	270	240
Food and related items	660	700
Fuel and lighting	160	130
Petrol for vehicle	150	160
House rent	220	175
Education	130	90
Tax	160	215
Miscellaneous	160	140
	1850	1850

show these data in a suitable graphs and interpret their behaviour.

(05 marks)

(b) At a newspaper office, the time required to set the front page was recorded for 50 days. The data, to the nearest tenth of a minute, are given below.

20.8	22.8	21.9	22.0	20.7	20.9
25.3	20.7	22.5	21.2	23.8	23.3
23.7	20.3	23.6	19.0	25.1	25.0
21.3	21.5	23.1	19.9	24.2	24.1
19.7	24.2	23.8	20.7	23.8	24.3

25.0	22.2	22.8	20.1
20.9	22.9	23.5	19.5
19.5	24.1	24.2	21.8
19.8	23.9	22.8	23.9
21.1	20.9	21.6	22.7

(i) Construct a frequency distribution with 0.7 minutes of class size.

(03 marks)

(ii) Find Mode, Median and Mean

(03 marks)

(iii) Construct frequency polygon

(03 marks)

(iv) Construct "less - than ogive.

(03 marks)

(v) From the ogive drawn, estimate the percentage of time taken as less than 24 minutes to make the front page.

(03 marks)

(Total 20 marks)

(03) (a) $P(A) = 0.70$

$P(B) = 0.32$

$P(A \cap B) = 0.25$

Find

(i) $P(A)'$

(ii) $P(B)'$

(iii) $P(A' \cap B)$

(iv) $P(A \cap B')$

(v) $P(A \cup B)$

(vi) $P(A' \cup B)$

(06 marks)

(b) The health department through 2 inspectors conducts two independent inspections for each restaurant, and restaurant should face both inspectors' tests. Inspector A is very experienced, and hence, passes only 2 percent of restaurants that actually do have health code violations. Inspector B is less experienced and passes 7 percent of restaurants with violations. What is the probability that

(i) Inspector A passes a restaurant, given that inspector B has found a violation?

(03 marks)

(ii) Inspector B passes a restaurant with a violation, given that inspector A passes it?

(03 marks)

(c) Seven red balls, four white balls and 9 black balls are in a box. If three balls are selected from the box at random, find the probability that, it will be

(i) two white balls and one red ball

(ii) three balls from different colours.

(04 marks)

(d) A doctor has decided to prescribe two new drugs to 200 heart patients as follows. 50 get drug A, 50 get drug B, and 100 get both. The 200 patients were chosen so that each had an 80 percent chance of having a heart attack if given neither drug. Drug A reduces the probability of a heart attack by 35 percent, drug B reduces the probability by 20 percent, and the two drugs, when taken together, work independently. If a randomly selected patient in the program has a heart attack, what is the probability that the patient was given both drugs?

(04 marks)

(Total 20 marks)

(04) (a) By giving reasons write down two examples for each of the situations where following distributions can be used.

(i) Binomial distribution

(ii) Poisson distribution

(iii) Normal distribution

(06 marks)

(b) A financial company recruiting Management Trainees. Every candidate is given five test papers. Each of these papers is judged as "Pass" or "Fail". A candidate needs to pass at least three papers to select for the second interview. Find the probability of passing a candidate to be called for the second interview.

(04 marks)

(c) During peak periods customers enter a bank at the rate of 90 per hour.
What is the probability that 4 or more customers enter the bank in a six minute interval during a peak period?

(04 marks)

(d) Mean weight of cabbages kept for sale in a super market is 600 g and standard deviation is 20 g. If the mean weight is normally distributed,

Find,

(i) the probability of mean weight of cabbages between 570 g and 610 g.

(ii) the over weight could be taken by 7% of cabbages.

(06 marks)

(Total 20 marks)

(05) Sunflower Garment Company has improved its market share over the past 10 years by increasing the number of stores. Currently, however the company does not have a systematic approach to selecting new sites. You need to develop a plan for opening several new stores. This plan must be able to forecast annual sales for all potential stores under consideration. You believe that the size of the store is significantly related to its success and want to incorporate this information into the decision making process.

To examine the relationship between the size of a store and its annual sales, a sample of six stores was selected. The results of these six stores are summarized in below.

Stores	Size (Square feet)	Annual Sales (in thousand rupees)
1	1700	3600
2	1600	3700
3	2800	6000
4	5500	9500
5	1300	3000
6	1100	2600

(i) How can you develop a statistical model that will allow you to forecast annual sales based on the sizes of the proposed new stores?

(ii) How reliable is the forecasted value of sales?

(iii) How useful do you think this model is for predicting sales?

(Total 20 marks)

(06) (a) Briefly Explain the characteristics of a good point estimator?

(04 marks)

(b) A certain television programme is watched by 55% of children and 30% of adults. If we take two samples randomly as 600 children and 400 adults and tested, what is the probability of the percentage of children who like to watch this TV programme is more than 20% of the percentage of adults who like to watch this TV programme?

(05 marks)

(c) A manager wish to decide the normal time to be spent to make certain number of holes on a metal sheet. How many samples should be selected to construct a statement at 95% confidence that the deviation of sample mean time from actual mean time is lower than 120 seconds?
(Assume that standard deviation is known from pre studies as 40 seconds)

(06 marks)

(d) The mean score of a random sample of 50 students appearing for an examination is 35 with a standard deviation 16. Establish a 98% confidence interval estimate of the mean score of all the students appearing for the examination.

(05 marks)

(Total 20 marks)

(07) (a) What is the power of hypothesis testing?

(01 marks)

(b) What are the types of errors of hypothesis testing?

(02 marks)

(c) Hinton Press hypothesizes that the average life of its largest press is 14,500 hours. They know that the standard deviation of press life is 2,100 hours. From a sample

of 25 presses, the company finds a sample mean of 13,000 hours. At a 0.01 significance level, show with the related calculations that the company should conclude that the average life of the press is less than the hypothesized values, 14,500 hours.

(07 marks)

(d) Mr. ABC Perera was appointed as new Chairman of Sri Lankan Insurance Company. He believes that lengths of stays in hospitals are dependent on the types of health insurance that people have. He asked his assistant to check the matter. His assistant collected data on a random sample of 660 hospital stays and summarized them below table.

		Days in Hospital			
		<5	5 - 10	>10	Total
Fraction of Costs covered by insurance	<25%	40	75	65	180
	25 - 50%	30	45	75	150
	>50%	40	100	190	330
Total		110	220	330	660

You are required to test whether the length of stay and type of insurance are independent or not at 1% level of significance.

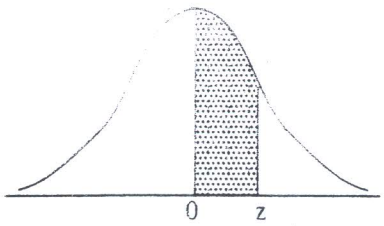
(10 marks)

(Total 20 marks)

TABLE A.1

Area Under Normal Curve

$$z = \frac{x - \bar{x}}{\sigma}$$



z	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0754
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990