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**University Examinations 2012/2013**

FIRST YEAR, FIRST SEMESTER EXAMINATIONS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION

**HCBA 3102: STATISTICS FOR BUSINESS**

**DATE: AUGUST 2012** **TIME: 3 HOURS**

**INSTRUCTIONS:** *Answer question **one** and any other **two** questions.*

## QUESTION ONE – (30 MARKS)

a) Classify the data below using classes 30-59, 60-89, 90-119 etc

| | | | | |
|---|---|---|---|---|
| 148 | 141 | 143 | 178 | 62 |
| 204 | 104 | 93 | 114 | 151 |
| 104 | 130 | 103 | 110 | 30 |
| 187 | 167 | 162 | 161 | 165 |
| 40 | 116 | 62 | 164 | 195 |
| 197 | 164 | 79 | 155 | 89 |
| 144 | 156 | 150 | 175 | 71 |
| 184 | 124 | 149 | 157 | 133 |
| 87 | 146 | 113 | 108 | 94 |
| 122 | 149 | 121 | 128 | 42 |

b) Calculate

i. Mean (2 Marks)
ii. Median (2 Marks)
iii. Mode (2 Marks)
iv. Variance (3 Marks)
v. Standard deviation (1 Mark)

c) Define Kurtosis and state the three types. (2 Marks)

d) The average travel time taken based on a random sample of 10 people working in a company to reach the office is 40 minutes with a standard deviation of 10 minutes.

Establish the 95% confidence interval for the mean travel time of everyone in the company. This will help the company to redesign the working hours. (4 Marks)

e) State the components of a time series. (2 Marks)

f) The following data refer to two variables; promotional expenses in Ksh and sales (1000 units) collected in the context of a promotional study. Calculate the correlation coefficient and comment. (4 Marks)

| **Promotional expenses (Ksh)** | **Sales in (1000 units)** |
|---|---|
| 7 | 12 |
| 10 | 14 |
| 9 | 13 |
| 4 | 5 |
| 11 | 15 |
| 5 | 7 |
| 3 | 4 |

g) State the Cobbs – Douglas production function and define all the variable involved. (2 Marks)

h) State the main features of a logit model and its merits. (4 Marks)

**QUESTION TWO (20 MARKS)**

a) Differentiate between type I and type II error. (2 Marks)

b) The marketing manager of a large restaurant has been asked to conduct a survey of its customers belonging to a particular income class. The owner of the restaurant is interested in the mean income of its customers. He is further interested in comparing this mean income with that of a recently concluded census study by the government. The government study shows a mean income of Ksh. 300,000 per year for this class of customers with a standard deviation of Ksh. 30,000. The owner is desirous of finding out whether the population mean of its customers in this category is Ksh. 30,000 per year or not. The marketing manager has picked up a random sample of 100 customers of this class from the customer database. The sample data show a mean income of Ksh.293,000 per year. Perform a comprehensive statistical hypothesis testing procedure and state your conclusions. Use the 95 confidence interval.

(8 Marks)

c) An investigator took a random sample of eight pieces of aluminium dic-castings and observed the sample mean strength to be 31.5. Before taking the measurement, the investigator knew that the population mean strength for an older type of aluminium dic casting was 33. The standard deviation of the sample measurements was 1.3. The investigator would like to know whether the population mean strength of the aluminium dic casting is 33.

i. Setup the null and alternative hypothesis

ii. Perform the test

iii. Comment on the results. (4 Marks)

d) A test in computer course was conducted to a group of MBA students, consisting of 70 men and 60 ladies. The marks scored by the students are as follows

| **Men** | **Ladies** |
|---|---|
| $n_1 = 70$ | $n_2 = 60$ |
| $\vec{x}_1 = 70$ | $\vec{x}_2 = 65$ |
| $\sum(x_1 - \vec{x}1)^2 = 7{,}500$ | $\sum(x_2 - \vec{x}_2)^2 = 7{,}500$ |

Is there a significant difference between the performance of the men and the ladies? (6 Marks)

**QUESTION THREE (20 MARKS)**

a) In a market survey conducted to examine whether the choice of a brand is related to the income strata of the consumers, a random sample of 600 consumers reveal the following

| Income strata income per month | Brand 1 | Brand 2 | Brand 3 | Brand 4 |
|---|---|---|---|---|
| < Ksh 10,000 | 132 | 128 | 50 | 310 |
| Ksh between 10,000-15,000 | 62 | 60 | 28 | 150 |
| Ksh between 15,000 – 20,000 | 30 | 30 | 26 | 86 |
| >20,000 | 16 | 22 | 16 | 54 |
| Total | 240 | 240 | 120 | 600 |

The manager who conducted this survey wants to know whether the brand preference is associated with the income strata at 5% level of significance using chi-square test statistic. (7 Marks)

b) A consumer marketing group desired to examine whether supermarket chains operating in a city differed in their "out of stock" levels for advertised specials. The group identified the relevant response variable as the percentage of the items advertised not in stock. The following table provides the data collected from three supermarket chains in the county

| Chain 1 | Chain 2 | Chain 3 |
|---|---|---|
| 15 | 10 | 17 |
| 14 | 14 | 12 |
| 20 | 9 | 14 |
| 15 | 10 | 15 |
| 16 | 11 | 12 |

The marketing group would like to know whether there are significant differences among the three chains with regard to mean percentage out of stock on advertised specials. How would you analyze this situation at 5% level of significance? (8 Marks)

c) A light bulb manufacturer claims that his bulbs last on average of 1000hrs with a standard deviation of 120. If 100 such bulbs are tested, find how many are likely to have a mean lifetime of ;

i. Between 986 and 1000 hrs
ii. Between 992 and 1012 hrs
iii. More than 1030 hrs (5 Marks)

**QUESTION FOUR (20 MARKS)**

a) Find the Karl Pearson correlation coefficient between X and Y given that

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| X | 39 | 43 | 21 | 64 | 57 | 47 | 28 | 75 | 34 | 52 |
| Y | 65 | 78 | 52 | 82 | 92 | 89 | 73 | 98 | 56 | 65 |

(6 Marks)

b) Eight patients underwent an operation in a hospital, measurements of weight (kg), duration of operation (minutes) and blood loss (ml) were taken. The hospital authorities would like to know whether the blood was related to weight and duration of operation. The data are as follows; (8 Marks)

| Weight ($x_1$) | Duration of operation ($x_2$) | Blood loss Y |
|---|---|---|
| 44 | 108 | 505 |
| 42 | 85 | 492 |
| 70 | 88 | 472 |
| 45 | 114 | 506 |
| 50 | 110 | 484 |
| 51 | 101 | 492 |
| 36 | 97 | 515 |
| 53 | 121 | 466 |

c) State four demerits of a logit model and its applications. (6 Marks)

**QUESTION FIVE (20 MARKS)**

a) A company is interested in forecasting demand for one of its products. Past data on demand for the last 12 months are available and given below: (7 Marks)

| Month | Sales (100 units) |
|---|---|
| 1 | 15 |
| 2 | 14 |
| 3 | 16 |
| 4 | 17 |
| 5 | 15 |
| 6 | 18 |
| 7 | 20 |

| | |
|---|---|
| 8 | 22 |
| 9 | 23 |
| 10 | 21 |
| 11 | 24 |
| 12 | 26 |

Using exponential smoothing technique forecast demand for month 13. Take $\propto = 0.2$.

b) The data below shows shipments (in millions of Ksh) for electric lighting and wiring equipment over a 12 month period. Use the data to compute a 4 month moving average for all available months. (5 Marks)

| **Month** | **Shipments** |
|---|---|
| January | 1056 |
| February | 1345 |
| March | 1381 |
| April | 1191 |
| May | 1259 |
| June | 1361 |
| July | 1110 |
| August | 1334 |
| September | 1416 |
| October | 1282 |
| November | 1341 |
| December | 1382 |

c) Suppose bankruptcy researchers examining the data below with 1987 as the base year

| **Year** | **Business bankruptcy** |
|---|---|
| 1987 | 81,463 |
| 1988 | 62,845 |
| 1989 | 62,449 |
| 1990 | 63,912 |
| 1991 | 70,605 |
| 1992 | 69,848 |
| 1993 | 62,399 |
| 1994 | 50,845 |
| 1995 | 50,516 |
| 1996 | 53,200 |
| 1997 | 53,819 |
| 1998 | 44,197 |
| 1999 | 37,639 |
| 2000 | 35,219 |
| 2001 | 39,719 |
| 2002 | 38,155 |

| | |
|---|---|
| 2003 | 35,037 |
| 2004 | 34,317 |
| 2005 | 39,201 |
| 2006 | 19,695 |
| 2007 | 28,322 |
| 2008 | 43,546 |

Compute index numbers using simple index number method (8 Marks)