

**INSTITUTE OF BANKERS IN MALAWI**

**DIPLOMA IN BANKING EXAMINATION**

**SUBJECT: INTRODUCTION TO BUSINESS STATISTICS (IOBM – D212)**

**Date: Wednesday, 19th November 2014**

**Time Allocated: 3 hours (08:00 – 11:00am hours)**

**INSTRUCTIONS TO CANDIDATES**

1 This paper consists of **TWO** Sections, A and B.

2 Section A consists of 4 questions, each question carries 15 marks.

Answer **ALL** questions.

3 Section B consists of 4 questions, each question carries 20 marks. Answer **ANY TWO** questions.

4 You will be allowed **10 minutes** to go through the paper before the start of the examination, you may write on this paper but not in the answer book.

5 Begin each answer on a new page.

6 **Please write your examination number on each answer book used. Answer books without examination numbers will not be marked.**

7 All persons writing examinations without payment will risk expulsion from the Institute.

8 If you are caught cheating, you will be automatically disqualified in all subjects seated this semester.

9 DO NOT open this question paper until instructed to do so.

**SECTION A (60 MARKS)**

**QUESTION 1**

1. Define a random variable. *(1 mark)*
2. List any **two** limitations of index numbers. (2 *Marks)*
3. Explain how "degrees of freedom" are used in Statistics? (2 *Marks)*
4. How are the significance value α and the critical region related? (2 *Marks)*
5. Why is the Ishikawa or Fishbone diagram important in Quality control? (2 *Marks)*
6. Discuss why there could be problems with seasonally adjusting the data over Eid

and Easter periods? (2 *Marks)*

1. Give any **two** disadvantages of the internal rate of return method of investment

appraisal. *(2 marks)*

h) Explain the term "feasible region" in Linear programming *(2 marks)*

**(Total 15 marks)**

**QUESTION 2**

1. Find z0 on the standard normal table:

i) Such that the area between z0 and z = -0.05 is 0.21645. *(3 marks)*

ii) For the 95th percentile. *(3 marks)*

(b) Find the rate of return from an investment that, for any initial payment of

K10, 000 yields returns of K6000 at the end of each of the first two years.

*(5 marks)*

(c) Find the p-value when the z-test value is 1:89 and the test is two tailed. *(4 marks)*

**(Total 15 marks)**

**QUESTION 3**

a) List any **four** properties of a Poisson experiment. *(4 marks)*

(b) Suppose the probability of a bank making a mistake in processing a deposit is

.0006.

If 10, 000 deposits are audited, what is the probability that more than 6 mistakes?

were made in processing deposits? *(6 marks)*

(c) If the variance of a national banking examination is 900, how large a sample is

needed to estimate the true mean score within 5 points with 99% confidence?

*(5 marks)*

**(Total 15 marks)**

**QUESTION 4**

(a) Consider the probability distribution given below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 |
| P(X) | 0.064 | 0.288 | 0.432 | 0.216 |

**Required:**

Explain if the distribution is binomial or not. *(4 marks)*

(b) In a newspaper poll of 1005 individuals, 452 thought they were worse off financially than a year ago. Find the 95% confidence interval for the true proportion of individuals who feel they are worse off financially. *(5 marks)*

(c) The data shown below represents Malawi's total revenue (in millions of kwacha)

of the top 18 exports for the months of July to December 2011:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 60; 520 | 22; 587 | | 7; 126 | 6; 665 | 6;166 | 3;264 |
| 2; 014 | 1; 945 | 1; 595 | | 1;520 | 960 | 943 |
| 852 | 655 | 598 | | 559 | 506 | 417 |

Source: *Trade briefs release* *NSO*

Use any method you know to check for normality.  *(6 marks)*

**(Total 15 marks)**

**SECTION B** **(40 MARKS)**

Answer **ANY TWO** questions from this section.

**QUESTION 5**

1. On Monday mornings, 4-Brothers Bank only has one teller window open for deposits and withdrawals. Customers arrive according to a Poisson distribution with an average number of 2:8 customers in a four-minute interval. Suppose the teller can serve no more than four customers in any four-minute interval at this window on a Monday morning.

1. What is the probability that, during any given four-minute interval, the teller

will be able to meet the demand? *(7 marks)*

1. When demand cannot be met during any given interval, a second window

is opened. What percentage of the time will a second window have to be opened? *(3 marks)*

(b) The data below are house loan applications per week that were not approved by

a bank over the second quarter of 2013.

|  |  |  |  |
| --- | --- | --- | --- |
| Week | Number | Week | Number |
| 1 | 55 | 7 | 156 |
| 2 | 64 | 8 | 162 |
| 3 | 64 | 9 | 192 |
| 4 | 87 | 10 | 195 |
| 5 | 99 | 11 | 227 |
| 6 | 131 | 12 | 243 |

**Required:**

Use a calculator to develop a linear regression model to fit the trend effects. Use the

value of r2 to comment on the suitability of the linear model. *(10 marks)*

**(Total 20 marks)**

**QUESTION 6**

1. A bank customer who plans to retire in 20 years has decided to put an amount A in the bank at the beginning of each of the next 240 months, after which she will withdraw K10, 000 at the beginning of each of the following 360 months. Assuming a nominal yearly interest rate of 6% compounded monthly, how large does A need to be? ( *8 marks)*
2. A private investor has held shares in 5 banks over a period of 5 years. The shareholding and market price per share on two dates are shown in the table below:

Company Number of shares held Price on 31-12-08 Price on 31-12-13

Chuma 200 330 214

Khusa 400 950 1780

Patsogolo 350 20500 28500

Alimi 500 6400 21500

Ageni 250 12500 28700

1. Calculate price relatives, rounded to the nearest whole number, showing

the price on 31st December 2013 with 31st December 2008 as base. Which bank's share price has increased by the greatest percentage? State the percentage increase. *(6 marks)*

1. Calculate the current weighted share price relative index for 31st December 2013 with 31st December 2008 as base. *(6 marks)*

**(Total 20 marks)**

**QUESTION 7**

1. According to the Banking Association, on-time performance by banks is

described as follows:

Customer service % of Time

Served on time 70.8

Served late because of network problems 8.2

Served late because teller is slow 9.0

Served late because of other reasons 12.0

Records of 200 customers for a major bank showed that 125 customers were served on time, 40 were delayed because of other reasons, 10 because of bank network problems, and the rest because the teller was slow. At α = 0:05, do these results differ from the Banking Association's statistics? *(10 marks)*

(b) The following data represent a sample of the assets (in millions of Kwacha) of 15 SACCOS in Malawi. Find the 90% confidence interval of the mean:

12.23; 16.56; 4.39; 2.89; 1.24; 2.17; 13.19; 9.16; 1.42; 73.25; 1.91; 14.64; 11.59; 12.24; 2.27; . *(10 marks)*

**(Total 20 marks)**

**QUESTION 8**

a) A bank takes weekly samples of customer account statements for 12 weeks with each sample containing 40 accounts. Auditors analyze the account statements, looking for non conforming statements. Shown here are the results of the 12 samples.

Sample Number of non-conforming statements

1 1

2 0

3 6

4 3

5 0

6 2

7 8

8 3

9 5

10 2

11 2

12 1

**Required:**

Use these data to construct a control chart for proportions of nonconforming statements,

indicating clearly the centerline and relevant limits. Comment on the control chart.

*(10 marks)*

1. Customers were asked to rate a bank both before and after viewing a

promotional video on the bank twice a day for a week. The data are displayed below:

Customer Rating Before Rating After

1 32 39

2 11 15

3 21 35

4 17 13

5 30 41

6 38 39

7 14 22

Assume that differences in ratings are normally distributed in the population and test at

α = 0:05 to determine whether there is a significant increase in the ratings of the bank

after watching the video. *(10 marks)*

**(Total 20 marks)**

**END OF EXAMINATION PAPER**