

**INSTITUTE OF BANKERS IN MALAWI**

**CERTIFICATE IN BANKING EXAMINATION**

**SUBJECT: FUNDAMENTALS OF BUSINESS STATISTICS**

**(IOBM – C103)**

**Date: Sunday, 28th April 2013**

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

**INSTRUCTIONS TO CANDIDATES**

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

2 Section A consists of 20 multiple questions, each question carries 2 marks.

Answer **ALL** questions.

3 Section B consists of 5 questions, each question carries 20 marks. Answer **ANY THREE** 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 DO NOT open this question paper until instructed to do so.

**SECTION A (40 MARKS)**

Answer **ALL** questions from this section.

1. Which of the following variables is not categorical?
2. Age of a person
3. Gender of a person
4. Nationality of a person
5. Marital status of a person
6. Which one of these statistics is not sensitive to outliers?
7. Mean c) Standard deviation
8. Inter-quartile range d) Range
9. How would an outlier affect the value of a correlation coefficient?
10. It will always reduce the value of a correlation coefficient.
11. It will always increase the value of a correlation coefficient.
12. It will have no effect on the value of a correlation coefficient.
13. It will either reduce or increase the value of a correlation coefficient, depending on its relative position.

**NOTE: For questions 4 and 5, use the following information:**

A bank’s customers were asked how often they use the bank’s ATM. The results were summarized according to age and are presented in the following table.

|  |  |  |
| --- | --- | --- |
| **Age (years)** | **Often** | **Not often** |
| Below 25 | 30 | 60 |
| 25 but below 40 | 90 | 100 |
| at least 40 | 20 | 100 |

1. Among the customers aged below 25, what is the likelihood of using the ATM often?
2. 0.33 c) 0.21
3. 0.08 d) 0.50
4. What is the probability that a randomly selected customer is at least 40 and does not often use the ATM?
5. 0.25 c) 0.14
6. 0.17 d) 0.05
7. To conduct a survey on ATM usage, a bank manager opens a printout to a random page, closes her eyes, puts a finger down on the page and then gets details of the next 5 customers. Which of the following statements are true?
8. The survey incorporates chance.
9. The procedure results in a simple random sample.
10. The procedure could easily result in selection bias.
11. i) and ii) c) i) and iii).
12. i) and iii) d) None of the above
13. The total costs (K’million) of importing 5 cars through the bank in January 2013 gave the following summaries: , .

The standard deviation (K’million) for the costs is:

1. 1.83 c) 4.20
2. 2.05 d) 16.81

**NOTE: For questions 8 – 11, use the following information:**

In a sample of 75 bank customers, 15 hold savings accounts, 50 hold current accounts, 10 hold both while 20 hold neither. **Supposition:** a customer is chosen at random from this sample. Let ‘A’ be the event “ **a customer holds savings account**” and ‘B’ be the event “ **a customer holds a current account** “.

1. Events ‘A’ and ‘B’ are:
2. Independent and mutually exclusive
3. Independent, but not mutually exclusive
4. Mutually exclusive but not independent
5. Neither mutually exclusive nor independent.
6. What is the probability that the customer hold a current account or a savings account?
7. 1.00 c) 0.73
8. 0.60 d) 0.87
9. What is the probability that hold a savings account but not a current account?
   1. 0.07 c) 0.27
   2. 0.20 d) 0.33
10. What is the probability that the resident does not hold a current?
11. 0.07 c) 0.27
12. 0.20 d) 0.33
13. Ignoring twins and other multiple births, assume babies born at a hospital are independent events with the probability that a baby is a boy and the probability that a baby is a girl both equal to 0.5. If the first 4 children born are girls, what is the probability the next born child is a boy?

a) 0.50. c) 0.80.

b) 0.75 d) 1.00.

1. A television station is interested in predicting whether or not voters are in favour of an increase in the value added tax. It asks its viewers to phone in and indicate whether they support or are opposed to an increase in the value added tax in order to generate additional revenue for education. Of the 2633 viewers who phone in, 1474 (55.98%) are opposed to the increase.

The sample obtained is a

1. Simple random sample
2. Stratified random sample
3. Probability sample in which each person in the population has the same chance of being in the sample
4. Probably biased.
5. There are three children in a room, ages three, four, and five. If a four- year-old child enters the room the
6. Mean age will stay the same but the standard deviation will increase.
7. Mean age and standard deviation will increase.
8. Mean age will stay the same but the standard deviation will decrease.
9. Mean age and standard deviation will stay the same .
10. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Makwacha. The number 73% is a
11. Sample b) parameter
12. Population d) Statistic.
13. In a certain game of chance, your chances of winning are 0.2. If you play the game five times and outcomes are independent, the probability that you win at least once is
14. 0.2000 c) 0.6723
15. 0.3277 d) 0.9997.
16. A set of data is found to have a sample standard deviation of 25. Suppose 9 were added to each of the numbers in the data. The standard deviation of the resulting data
17. Cannot be determined
18. Would be 28
19. Would be 34
20. Would be 25
21. The correlation coefficient measures:

a) The strength of the relationship between two variables.

b) Whether or not a scatter diagram shows an interesting pattern.

c) Whether a cause and effect relation exists between two variables.

d) The strength of a straight line relation between two variables.

1. A survey asked people how often they exceed speed limits. The data is then categorized into the following contingency table of counts showing the relationship between age group and response.

|  |  |  |  |
| --- | --- | --- | --- |
| Age (years) | Response | |  |
| Always | Not always | Total |
| Under 30  Over 30 | 100  40 | 100  160 | 200  200 |
| Total | 140 | 260 | 400 |

Among people with age *over 30*, what's the "risk" of always exceeding the speed limit?

a) 0.20 c) 0.33

b) 0.40 d) 0.50

1. In a statistics course a linear regression equation was computed to predict the final exam score from the score on the first test. The equation of the least squares regression line was

y = 10 + 0.9x

where y represents the final exam score and x is the score on the first exam.

Suppose Joe scores a 90 on the first exam. What would be the predicted value of his score on the final exam?

* 1. 91
  2. 89
  3. 81
  4. Cannot be determined. We also need to know the correlation.

**SECTION B (60 MARKS)**

Answer **ANY THREE** questions from this section

**QUESTION 2**

1. What is the difference between qualitative data and quantitative data? *(2 marks)*
2. Give **two** examples of qualitative data and **two** examples of quantitative data. *(4 marks)*
3. The numbers of queries registered by the customer care service desks of 24 service centres on a particular day are as follows:

50 14 25 8 10 33 52 12

45 15 7 5 98 13 31 52

6 75 17 22 12 64 33 71

**Required:**

1. Find the average number of queries recorded on this particular day.

*(3 marks)*

1. Using 0 as the lowest class limit and a class width of 20, produce a grouped frequency distribution to present this set of data.

*(4 marks)*

1. Using the data presented in the grouped frequency distribution,
2. Calculate the mean. *(5 marks)*
3. Comment on why this mean is different from the mean calculated in part (i) above. *(2 marks)*

**(Total 20 marks)**

**QUESTION 3**

1. Suggest and describe any **two** ways of investigating the relationship between any two variables. *(4 marks)*
2. Consider the relationships given below. Which of the relationships are likely to have a positive correlation coefficient and which are likely to have a negative correlation coefficient? Explain why.

(i) The demand for maize and their price

(ii) The average temperature of countries and the sales of warm clothing.

(iii) The population of countries and the amount of waste they generate

(iv) The income of people and the amount of income tax they pay. (*8 marks)*

1. A bank has employed two Market Executives to market a new bank product. The salesmen, Mangani and Pindani, must each make two calls per day, one in the morning and one in the afternoon. Mangani has probability 0.5 of selling the product on any call, while Pindani has probability 0.2 of making a sale. Mangani works independently of Pindani and, for each market executive, morning and afternoon results are independent of each other.

**Required:**

Compute the probability that, in one day:

1. Mangani makes two sales (*4 marks)*

(ii) Pindani makes at least one sale. (*4 marks)*

**(Total 20 marks)**

**QUESTION 4**

(a) Explain what the following are intended to show or portray about any set of data they are calculated from and for each measure give **one** example:

(i) Measures of location *(3 marks)*

(ii) Measures of spread (*3 marks)*

(b) A bank is investigating the number of customers that use its ATMs during lunch hour. An analyst collects data from 20 ATMs and the data collected showed the following distribution:

35 18 27 17 36 16 45 38 29 46

48 39 26 51 19 28 49 35 55 37.

(i) Construct a stem and leaf display (*4 marks)*

(ii) Use the stem and leaf display constructed in part (i) to find the following

1. mode *(2 marks)*
2. median (*2 marks)*

(iii) Use a method of your choice to find the standard deviation. *(6 marks)*

**(Total 20 marks)**

**QUESTION 5**

A company is monitoring the number of sales it makes against the number of quotations its sales team sends out to potential clients. The following table summarises the number of quotations issued and the number of sales made by a sample of salesmen. The figures all refer to the same period of time.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No. of quotations** | 120 | 200 | 90 | 160 | 110 | 100 | 240 | 180 |
| **No. of sales** | 80 | 105 | 60 | 80 | 50 | 60 | 140 | 100 |

**Required:**

1. Construct a scatter diagram to illustrate this information. *(4 marks)*

b) (i) Calculate the least squares regression line of the number of sales on number of quotations. *(7 marks)*

(ii) Explain how the line found in part (i) can be used. *(2 marks)*

1. Calculate the product moment correlation coefficient. Briefly comment on your result. *(4 marks)*
2. Calculate the coefficient of determination and interpret the result you obtain. *(3 marks)*

**(Total 20 marks)**

**QUESTION 6**

1. There are many data collection methods at a researcher’s disposal. Two of them are telephone interviews and questionnaires.
2. State any **two** reasons why some researchers prefer telephone interviews and **two** reasons why others do not prefer them. (*4 marks)*
3. State the difference between internal and external data sources. Give **an** example on each of these. *(4 marks)*
4. Give **one** advantage of internal data sources and **one** advantage of external data sources. *(2 marks)*
5. A new bank has recorded the number of customers that applied to open new accounts at four of its service centres located at Jali, Makwasa, Lunzu and Mpemba as shown in the following table:

|  |  |
| --- | --- |
| **Service Centre** | **Account type** (No. of applicants) Phindu Khusa Pata Sunga |
| Jali Makwasa Lunzu Mpemba | 255 310 175 200 405 375 180 270 75 55 30 50  110 175 150 105 |

The bank has hired you to construct a single chart that will help him compare the number of new applications.

**Required:**

1. State **two** charts that you think would be appropriate to present these data and, for each, give **one** reason for your answer. (*4 marks)*
2. Construct a fully labeled appropriate chart of your choice to present these data. You are advised to put service stations on the horizontal axis. *(6 marks)*   
    **(Total 20 marks)**

**END OF EXAMINATION PAPER**