



ZIMBABWE EZEKIEL GUTI UNIVERSITY

FACULTY OF BUSINESS, ECONOMICS AND ACCOUNTING

DEPARTMENT OF ECONOMICS AND BUSINESS SCIENCES

EXAMINATION PAPER

COURSE CODE : CBM103
COURSE TITLE : QUANTITATIVE ANALYSIS FOR BUSINESS
DURATION : 3 Hours
DATE : 19 July 2019

INSTRUCTIONS TO CANDIDATES:

1. No cell phones are allowed in the examination venue.
2. Answer any **FOUR (4)** questions.
3. Begin each question on a new page.
4. The number of marks for each question or part question is shown in brackets []

QUESTION 1

- a. A questionnaire was distributed at a large university to find out the level of student satisfaction with various activities and services. For example, concerning parking availability, students were asked to indicate their level of satisfaction on a scale from 1 (very dissatisfied) to 5 (very satisfied). Is a student's response to this question numerical or categorical? If numerical, is it discrete or continuous? If categorical, give the level of measurement. **[2 marks]**
- b. Bank clients were asked to indicate their level of satisfaction with the service provided by the bank's tellers. Responses from a random sample of customers were as follows: 69 were very satisfied, 55 were moderately satisfied, 5 had no opinion, 3 were moderately dissatisfied, and 2 were very dissatisfied.
Construct a simple bar chart showing the above-mentioned information. **[5 marks]**
- c. A sample of 20 financial analysts was asked to provide forecasts of earnings per share of a corporation for next year. The results are summarized in the following table:

Forecast (\$ per share)	Number of Analysts
\$9.95 to under \$10.45	2
\$10.45 to under \$10.95	8
\$10.95 to under \$11.45	6
\$11.45 to under \$11.95	3
\$11.95 to under \$12.45	1

Estimate the sample:

- i. Mean **[3 marks]**
- ii. Median **[3 marks]**
- iii. Mode **[3 marks]**
- iv. Variance **[3 marks]**
- v. Standard deviation **[3 marks]**
- vi. Skewness **[3 marks]**

QUESTION 2

- a) The probability of A is 0.60, the probability of B is 0.45, and the probability of either is 0.80. What is the probability of both A and B ? [4 marks]
- b) A production manager knows that 5% of components produced by a particular manufacturing process have some defect. Six of these components, whose characteristics can be assumed to be independent of each other, are examined.
- i. What is the probability that none of these components has a defect? [2 marks]
 - ii. What is the probability that one of these components has a defect? [3 marks]
 - iii. What is the probability that at least two of these components have a defect? [5 marks]
- c) Let the random variable X follow a normal distribution with $\mu = 80$ and $\sigma^2 = 100$.
- i. Find the probability that X is greater than 60. [3 marks]
 - ii. Find the probability that X is greater than 72 and less than 82. [4 marks]
 - iii. The probability is 0.1 that X is greater than what number? [4 marks]
 - iv. The probability is 0.6826 that X is in the symmetric interval about the mean between which two numbers?

QUESTION 3

- a. A company that receives shipments of batteries tests a random sample of nine of them before agreeing to take a shipment. The company is concerned that the true mean lifetime for all batteries in the shipment should be at least 50 hours. From past experience it is safe to conclude that the population distribution of lifetimes is normal with a standard deviation of 3 hours. For one particular shipment the mean lifetime for a sample of nine batteries was 48.2 hours. Test at the 10% level the null hypothesis that the population mean lifetime is at least 50 hours. [15 marks]
- b. You are a financial adviser. Your client is thinking of investing \$600 at the end of every six months for the next six years with the invested funds earning 6.4% compounded semi-annually. Your client wants to know how much money she will have after six years. What do you tell your client? [10 marks]

QUESTION 4

River Hills Hospital is interested in determining the effectiveness of a new drug for reducing the time required for complete recovery from knee surgery. Complete recovery is measured by a series of strength tests that compare the treated knee with the untreated knee. The drug was given in varying amounts to 18 patients over a 6-month period. For each patient the number of drug units, X , and the days for complete recovery, Y , are given by the following (x, y) data:

(5, 53) (21, 65) (14, 48) (11, 66) (9, 46) (4, 56) (7, 53) (21, 57) (17, 49) (14, 66) (9, 54) (7, 56)
 (9, 53) (21, 52) (13, 49) (14, 56) (9, 59) (4, 56)

- a. Plot the data. [5 marks]
- b. Estimate the linear regression equation of the number of drug units and the days for complete recovery [8 marks]
- c. Compute the covariance. [3 marks]
- d. Compute the coefficient of determination [3 marks]
- e. Compute the correlation coefficient. [3 marks]
- f. Briefly discuss the relationship between the number of drug units and the recovery time. [3 marks]

QUESTION 5

- a) The following are annual sales in millions of dollars from 2004 to 2018

Year	Sales (\$ million)
2004	5
2005	2
2006	4
2007	9
2008	12
2009	17
2010	10
2011	6
2012	13
2013	20
2014	18
2015	9
2016	16
2017	22
2018	20

- i. Determine a 5-year moving average for the sales [4 marks]
- ii. Plot line graph of sales and comment on your graphs [4 marks]

b) Solve the following equations: $\frac{5}{x} + \frac{3}{x+4} = \frac{7}{x}$ [2 marks]

c) The equilibrium conditions for two complementary goods, slacks (S) and Jackets (J) are given below:

$$470 - 8P_s - 2P_j = 0$$

$$415 - P_s - 5P_j = 0$$

Calculate the prices that will bring equilibrium to the model. [4 marks]

d) For the following function: $y = (2x+3)(8x^2-6)$:

i. Find the second order derivative and evaluate it at $x=2$. [5 mark]

e) Find for the following total function: $\pi = Q^2 - 13Q + 78$

i. The marginal function and evaluate it at $Q = 5$ [3 marks]

ii. The average functions and evaluate it at $Q = 5$ [3 marks]