

## **IAB LCCI Level 3 Certificate in Business Statistics**

Overview of content

### **Management Information: The External and Internal Business Environment**

Data collection

Descriptive statistics

### **Business Planning Models**

Correlation and regression

Time-based data

### **Risk Management and Business Decision Making**

Probability, including the normal distribution

Estimation and confidence intervals

Significance testing

Chi squared test

### **Quality Assurance and Control**

Quality control

## **GROUP 1 – SELECT SIX (x4 marks each)**

Question 1 - MCQ

What is the main difference between a census and a survey?

- a) A census is conducted on a larger scale, while a survey is smaller.
- b) A census collects data from all members of a population, while a survey only collects data from a sample.
- c) A census is used for internal business use, while a survey is used for external purposes.
- d) A census is more expensive to conduct than a survey.

Answer b) A census collects data from all members of a population, while a survey only collects data from a sample.

Question 2 - MCQ

A company wants to calculate the mean temperature of its factory over a period of three days. The temperatures recorded are

Day 1 20°C

Day 2 23°C

Day 3 23°C

What is the mean temperature?

Answer  $(20 + 23 + 23) / 3 = 22^\circ\text{C}$

Question 3 - MATCH ITEMS

Match the following data collection methods with their corresponding advantages and disadvantages

|                        |                                                                       |
|------------------------|-----------------------------------------------------------------------|
| 1.Interview            | A). In-depth information, rapport building, Time-consuming, expensive |
| 2.Postal Questionnaire | B). Cost-effective, wide reach, Low response rate, no interaction     |
| 3.Telephone Survey     | C). Quick and efficient, good for large samples, may be biased        |

Question 4 - MRQ

What are the different methods of sampling? (Select all correct answers)

- a) Random
- b) Systematic
- c) Multistage
- d) Quota

Answer a, b, c, and d

Question 5 - MCQ

What is statistical bias?

- a) The tendency of a sample to be representative of the population
- b) The tendency of a sample to be unrepresentative of the population
- c) A method used to correct for non-response in surveys
- d) An error that occurs when collecting data

Answer b) The tendency of a sample to be unrepresentative of the population

Question 6 - INSERT VALUE

A company wants to calculate the standard deviation of its employees' ages, with the following data

| Employee | Age (years) |
|----------|-------------|
| John     | 35          |
| Jane     | 28          |
| Bob      | 42          |
| Sarah    | 32          |

What is the standard deviation?

Answer 5.90

Question 7 - MCQ

What is the main difference between a census and a survey?

- A) A census is conducted on a larger scale, while a survey is smaller.

B) A census is used to gather data from all members of a population, while a survey is used to gather data from a sample of the population.

C) A census is only used for business data, while a survey is used for personal data.

D) A census is conducted through interviews, while a survey is conducted through questionnaires.

Answer B) A census is used to gather data from all members of a population, while a survey is used to gather data from a sample of the population.

#### Question 8 - MATCH ITEMS

Match the following sampling methods with their descriptions

|               |                                                                                   |
|---------------|-----------------------------------------------------------------------------------|
| A) Random     | 1. Selects individuals at random from a list of potential participants.           |
| B) Systematic | 2. Involves selecting every nth individual in a population.                       |
| C) Quota      | 3. Involves selecting a certain number of individuals based on specific criteria. |
| D) Multistage | 4. Involves selecting a sample and then further dividing it into smaller groups.  |

#### Answers

A) 1, B) 2, C) 3, D) 4

#### Question 9 - MRQ

What are the advantages of using stratification in sample design?

A) Increases the likelihood of including minority groups

B) Reduces bias by selecting participants from different strata

C) Increases the cost of data collection

D) Decreases the accuracy of the results

Answers A, B

Question 10 - MCQ

What is statistical bias in the context of data collection?

- A) The tendency for some individuals to respond more positively than others
- B) The tendency for some individuals to respond more negatively than others
- C) The tendency for certain groups or categories to be over- or under-represented in a sample
- D) The tendency for all respondents to provide accurate and truthful answers

Answer C) The tendency for certain groups or categories to be over- or under-represented in a sample

**GROUP 2 – SELECT SIX (x4 marks each)**

Question 11 - MCQ

What is the purpose of a correlation coefficient?

- A) To measure the strength of a relationship between two variables
- B) To forecast future values of a time series
- C) To identify outliers in a data set
- D) To calculate the mean of a data set

Answer A) To measure the strength of a relationship between two variables

Question 12 - MRQ

What are the components of a time series? (Select all that apply)

- A) Trend

- B) Seasonality
- C) Cyclical movements
- D) Irregular variations

Answer A, B, C, D

#### Question 13 - MCQ

What is the purpose of plotting a least squares regression line on a scatter diagram?

- A) To show the average value of each variable.
- B) To illustrate the correlation between the variables.
- C) To identify outliers in the data.
- D) To demonstrate the best-fitting linear relationship.

Answer D) To demonstrate the best-fitting linear relationship.

#### Question 14 - MATCH ITEMS

Match the following correlation coefficients with their definitions

|                                            |                                                                                                |
|--------------------------------------------|------------------------------------------------------------------------------------------------|
| A) Product moment correlation coefficient  | 1. Measures the strength and direction of a linear relationship between two variables          |
| B) Spearman's rank correlation coefficient | 2. Ranks the data points based on their values and then calculates the correlation coefficient |
| C) Coefficient of determination            | 3. Measures how well a regression line explains the variation in the dependent variable        |
| D) Regression equation                     | 4. Represents the equation of a linear regression line                                         |

Question 15 - MCQ

A scatter diagram shows no correlation between two variables, X and Y. The equation of the least squares regression line is  $Y = 0X + 4$ . What is the most likely reason for this lack of correlation?

- A) The data is too noisy or contains outliers.
- B) The data is insufficient to draw any conclusions about the relationship.
- C) The relationship is non-linear, making it difficult to detect with a simple linear regression model.
- D) The variables are independent and have no underlying relationship.

Answer D) The variables are independent and have no underlying relationship.

Question 16 - MATCH ITEMS

Match the following components of a time series into the correct category

|                          |                               |
|--------------------------|-------------------------------|
| A). Trend                | 1.Components of a time series |
| B). Seasonality          | 2.Components of a time series |
| C). Cyclical movements   | 3.Components of a time series |
| D). Irregular variations | 4.Types of data variation     |

Question 17 - MCQ

What is the purpose of seasonally adjusted values in a time series?

- A) To identify outliers in the data
- B) To forecast future values
- C) To remove the effects of seasonal variation from the data
- D) To calculate the mean of the data

Answer C) To remove the effects of seasonal variation from the data

Question 18 - INSERT VALUE

A company wants to calculate its overall sales performance using a weighted index. The weights and prices of three products are as follows:

| Product | Price | Weight |
|---------|-------|--------|
| A       | £10   | 0.4    |
| B       | £8    | 0.3    |
| C       | £12   | 0.3    |

What is the weighted index value?

Answer £10

Question 19 - INSERT VALUE

A country's NIRP is calculated as follows:

| Product | Price | Weight |
|---------|-------|--------|
| TV      | £300  | 0.3    |
| Phone   | £100  | 0.2    |
| Laptop  | £250  | 0.5    |

What is the NIRP value?

Answer £235

Question 20 - MCQ

A stock market has collected the following weekly returns for the past year:

| Week | Return (%) |
|------|------------|
| 1    | -0.5       |
| 2    | 1.2        |
| 3    | 0.8        |
| 4    | -1.1       |
| 5    | 0.9        |

What is the most likely cause of the fluctuation in the return data?

- A) Economic indicators such as GDP or inflation rates.
- B) Market sentiment and investor emotions.
- C) News events and market announcements.
- D) Random chance.

Answer B) Market sentiment and investor emotions.

**GROUP 3 – SELECT SIX (x4 marks each)**

Question 21 - MCQ

What is the purpose of using probability in a business environment?

- A) To predict future outcomes with certainty
- B) To make decisions based on uncertain events
- C) To avoid taking risks altogether
- D) To measure the average performance of a team

Answer B) To make decisions based on uncertain events

Question 22 - MRQ

Select all correct responses to the following question

What are some examples of mutually exclusive and independent events in a business context?

- A) Winning or losing a contract
- B) Increasing or decreasing sales revenue
- C) Launching a new product or recalling a faulty one
- D) All of the above

Answer A, B, D

Question 23 - MCQ

What is the purpose of testing for significance of a correlation coefficient?

- A) To determine if the relationship is strong enough to be useful.
- B) To identify outliers in the data.
- C) To measure the strength of the relationship between variables.
- D) To demonstrate that the correlation is not due to chance.

Answer D) To demonstrate that the correlation is not due to chance.

Question 24 - MCQ

What is the purpose of converting a general normal distribution to a standard normal distribution?

- A) To make it easier to calculate probabilities
- B) To compare two distributions with different means and standard deviations
- C) To determine whether there is a significant association between two variables
- D) To predict future outcomes with certainty

Answer A) To make it easier to calculate probabilities

Question 25 - MRQ

Select all correct responses to the following question

What are some scenarios in which you would use a statistical test?

- A) To determine whether there is a significant association between two variables
- B) To predict future outcomes with certainty
- C) To make decisions based on uncertain events
- D) To speed up decision making

Answer A, C

Question 26 - MCQ

What is the main difference between an additive and multiplicative seasonal adjustment model?

- A) The additive model uses a constant to adjust for seasonality, while the multiplicative model uses a percentage change.
- B) The additive model uses a percentage change to adjust for seasonality, while the multiplicative model uses a constant.
- C) The additive model adjusts for seasonality by adding or subtracting a fixed amount, while the multiplicative model adjusts by multiplying or dividing by a factor.
- D) There is no difference between the two models.

Answer C) The additive model adjusts for seasonality by adding or subtracting a fixed amount, while the multiplicative model adjusts by multiplying or dividing by a factor.

Question 27 - MCQ

What is the term used to describe the process of finding a single value that represents a population based on a sample of data?

- A) Estimation
- B) Probability
- C) Confidence Interval
- D) Hypothesis Testing

Answer A) Estimation

Question 28 - MCQ

What is the purpose of calculating the coefficient of determination (R-squared)?

- A) To measure the strength of the relationship.

B) To determine the significance of the regression equation.

C) To calculate the residual values.

D) To forecast future values.

Answer A) To measure the strength of the relationship.

#### Question 29 - MATCH ITEMS

Match the following statistical test with its appropriate description

|                                                                     |                                                                           |
|---------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1. Single mean test for large samples using the normal distribution | A). Test for testing a single sample mean against a known population mean |
| 2. Paired comparison test using the t distribution                  | B). Test for comparing two related samples                                |
| 3. Chi-squared test for association using contingency tables        | C). Test for analysing the relationship between two categorical variables |
| 4. Two proportion tests                                             | D). Test for comparing two independent proportions                        |

#### Question 30 - MATCH ITEMS

Match the following statistical concepts into their correct categories

|                               |                         |
|-------------------------------|-------------------------|
| A). Mutually exclusive events | 1. Probability concepts |
| B). Independent events        | 2. Event relationships  |
| C). Conditional probability   | 3. Event relationships  |

|                              |                    |
|------------------------------|--------------------|
| D). Mathematical expectation | 4. Expected values |
|------------------------------|--------------------|

**GROUP 4 – SELECT SIX (x4 marks each)**

Question 31 - MCQ

What is the primary advantage of setting up quality control charts?

- A) To track employee performance
- B) To identify trends in data
- C) To detect unusual patterns and take corrective action
- D) To monitor customer satisfaction

Answer C) To detect unusual patterns and take corrective action

Question 32 - MCQ

A company is using a mean chart to control the quality of its products. The average product weight is 5 kg, with a standard deviation of 0.2 kg. What is the warning line on this chart?

- A) 4.95 kg
- B) 5.05 kg
- C) 5.2 kg
- D) 4.8 kg

Answer C) 5.2 kg (Warning line = Mean + 1 standard deviations)

Question 33 - MCQ

What are the three main types of quality control charts?

- A) Control charts, scatter diagrams, and histograms
- B) Bar charts, pie charts, and Pareto charts
- C) Mean charts, range charts, and S chart
- D) Histograms, box plots, and Q-Q plots

Answers C) Mean charts, range charts, and S chart

Question 34 - MCQ

What is the main purpose of a range chart?

- A) To detect unusual patterns
- B) To track employee performance
- C) To monitor customer satisfaction
- D) To control quality

Answer A) To detect unusual patterns

Question 35 - MCQ

A company is using a mean chart to control the quality of its products. The average product weight is 5 kg, with a standard deviation of 0.2 kg. What is the action line on this chart?

- A) 4.8 kg
- B) 5.1 kg
- C) 5.2 kg
- D) 5.4 kg

Answer D) 5.4 kg (Action line = Mean + 2 standard deviations)

Question 36 - MATCH ITEMS

Match the following types of quality control charts with their descriptions

|                    |                                                                                                               |
|--------------------|---------------------------------------------------------------------------------------------------------------|
| A) Control chart   | 1. Uses a statistical method to detect unusual patterns                                                       |
| B) Scatter diagram | 2. A graphical display of data that can be used for visualizing and exploring relationships between variables |
| C) Histogram       | 3. A graphical display of the distribution of data                                                            |

Question 37 - MCQ

What is the primary advantage of using statistical techniques in business?

- A) To track employee performance
- B) To identify trends in data
- C) To detect unusual patterns and take corrective action
- D) To monitor customer satisfaction

Answer C) To detect unusual patterns and take corrective action

Question 38 - MATCH ITEMS

Match the following statistical terms with their definitions:

|                        |                                                                                  |
|------------------------|----------------------------------------------------------------------------------|
| A) Mean chart          | 1. A graphical representation of data showing the average value.                 |
| B) Normal distribution | 2. A type of probability distribution where most values cluster around the mean. |
| C) Standard deviation  | 3. A measure of how spread out a set of data is.                                 |

Question 39 - MRQ

What are some skills that should be developed throughout the course of study for Business Statistics?

(Mark all correct answers)

- A) Use and apply statistical techniques in a range of business contexts
- B) Select and justify appropriate statistical methods and tests as an aid in solving business problems
- C) Collect, analyse and interpret results of diagrams, charts and graphs and information
- D) Forecast future sales

Answer A, B, C

Question 40 - MRQ

What are some types of data that can be analysed using Business Statistics?

(Mark all correct answers)

- A) Market research data
- B) Financial data
- C) Manufacturing data
- D) Economic indicators

Answer A, B, C, D

**MCQ GROUP – SELECT SIX (x2 marks each)**

Question 41 - TRUE/FALSE

True or False Stratification is a method of sampling that ensures every member of the population has an equal chance of being selected.

Answer FALSE (Stratification is a method of sampling that divides the population into subgroups, ensuring that each subgroup is proportionally represented in the sample)

Question 42 - INSERT VALUE

The coefficient of variation is defined as the ratio of \_\_\_\_\_ to the mean, expressed as a \_\_\_\_\_.

Answer standard deviation, percentage

Question 43 - TRUE/FALSE

A questionnaire should be designed to gather as much information as possible.

Answer FALSE

Question 44 - TRUE/FALSE

A quota sample is a method of sampling where every individual in the population has an equal chance of being selected.

Answer FALSE

Question 45 - INSERT VALUE

The process of planning and preparing for \_\_\_\_\_ includes deciding what types of data to gather and how to obtain it.

Answer Data collection

Question 46 - TRUE/FALSE

True/False

True or False A moving average is a suitable method for identifying the trend in a time series.

Answer True

Question 47 - TRUE/FALSE

True or False A confidence interval for a mean using the t-distribution is only applicable for small samples.

Answer TRUE

Question 48 - TRUE/FALSE

The chi-squared test is used to compare two mean values.

Answer FALSE

Question 49 - MRQ

What are some of the advantages of using control charts for mean?

Select all correct answers:

- A) To monitor and detect trends
- B) To identify and correct problems quickly
- C) To increase production costs
- D) To improve employee morale

Answer: B) To identify and correct problems quickly, A) To monitor and detect trends

Question 50 - MRQ

Which of the following are types of statistical errors that can occur when performing a statistical test?

Select all correct answers

- A. Type I error
- B. Type II error
- C. Type I and other errors
- D. Neither Type I nor Type II error

Answer B) Both A and B