

BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF COMMERCE
DEPARTMENT OF ECONOMICS
BACHELOR OF SCIENCE HONOURS DEGREE IN ECONOMICS
STATISTICS FOR ECONOMISTS II EXAMINATION
COURSE CODE: EC108 (1) DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Answer all questions
2. The paper carries four questions
3. All questions carry equal marks of 25 each
4. No cell-phones allowed in the examination room

NOV 2023

QUESTION 1

- a) A machine that fills bags with rice is known to have a standard deviation of 0.5 grams. Construct a 95% confidence interval for the population mean, if a random sample of filled bags had weights, in grams, as follows: 497.15, 498.21, 497.93, 497.46, 498.91, 497.61
[6 marks]
- b) In order to understand student life, the Student Affairs Division of Bindura University of Science Education carried out a survey on student walking distances to College. Out of 633 students surveyed, 105 walk to college. Construct an approximate 95% confidence interval for the population proportion.
[7 marks]
- c) State the 3 sources of variability in the total sample data as identified under ANOVA.
[3 marks]
- d) If four samples (groups) each consisting of 10 observations are being compared, with $SST = 25.5$ and $SSTotal = 204.6$,
(i) Calculate F -stat and identify F -crit, given a 5% level of significance.
[4 marks]
(ii) Conduct a hypothesis test to test whether the population means are equal across the four groups. What conclusion is drawn?
[5marks]

QUESTION 2

- a) Explain the meaning of type 1 error and type 2 error in hypothesis testing. [3 marks]
- b) A batch of shoelaces is subjected to a statistical hypothesis test to test for conformity to a specification for length, prior to shipment of the batch to consumers. In this context which error is more costly, a type 1 error or a type 2 error? [2 marks]
- c) Bags of peanuts are claimed to weigh 'not less than 25 g, on average'. It is known that the standard deviation of the bag weights is $\sigma = 3$ g. Test at 1% level of significance, the claim, if a random sample of bag weights were as follows: 21, 22, 22, 26, 19, 22 [8 marks]
- d) In order to compare which grocery store is more expensive between the two prominent Supermarkets, Spar and OK, the prices of a number of randomly selected greengrocery items were compared in two outlets. The data below show the price in cents, for each item, in each outlet:

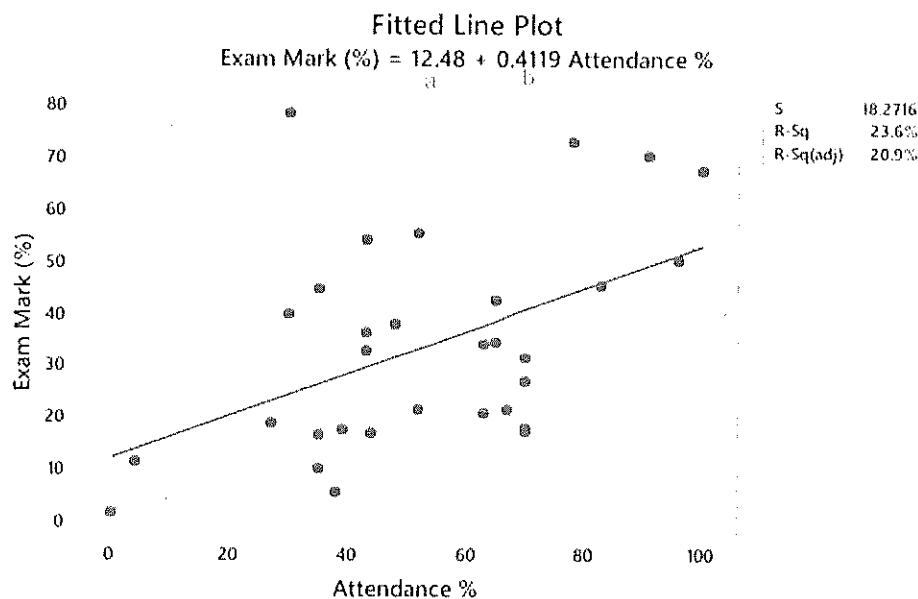
Item	SPAR	OK
Pears	119	135
Lettuce	109	125
Bananas	123	115
Mango	89	123
Avocado	75	105
Lemon	32	48
Celery	99	115

Determine with 95% confidence the grocery store which is less expensive than the other.

[12 marks]

QUESTION 3

- a) The sample regression equation that relates shoe-size and height is
 $\text{Height} = 148.2 + 3.677 \text{ Shoe-Size}$ ($Y = 148.2 + 3.677 X$)
 Suppose you find a size 6.5 shoe-print made by an unknown intruder. Estimate how tall this person is? [3 marks]
- b) A lecturer made a note of the rates of attendance, and the final exam marks, of a number of students on a science course. Take a look at the fitted line plot below and explain what is meant by b , a , $R\text{-Sq}(\text{adj})$ and S . [9 marks]



- c) Some output is shown below from a regression analysis of final exam marks on Attendance ($Y = \alpha + \beta X$).

Term	Coef	SE Coef	T-Value	P-Value
Constant	12.48	8.03	1.56	0.131
Attendance %	0.412	0.138	2.99	0.006

Test the two null hypotheses $\beta=0$ and $\alpha=0$, and state your conclusions. [13 marks]

Question 4

- a) What is an index number? Give a practical example of an index number [2 marks]
- b) List the factors that must be considered when planning the construction of an index number. [3 marks]
- c) Honda Center, a motorcycle dealer, has recorded the unit prices and quantities sold of three models of the Honda motorcycle for 2009 and 2010 in Zimbabwe. The quantities sold and unit selling prices for both these years are given in the following table:

Motorcycle model	2019		2020	
	Unit price (ZWL\$ 000)	Quantity (units sold)	Unit price (ZWL\$ 000)	Quantity (units sold)
A	25	10	30	7
B	15	55	19	58
C	12	32	14	40

- (i) Calculate the composite **price index** for 2010 with 2009 as the base period using the Laspeyres weighted aggregates method. **[10 marks]**
- (ii) Calculate the composite **quantity index** for 2010 with 2009 as the base period using the Paasche weighted aggregates method. **[10 marks]**