

BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF COMMERCE
DEPARTMENT OF ECONOMICS
PROGRAMMES: BSc HONOURS DEGREE IN ECONOMICS
EC 203: QUANTITATIVE METHODS
DURATION: 3 HOURS

OCT 2024

INSTRUCTIONS:

1. Answer all questions
2. NO CELLPHONES ALLOWED IN THE EXAMINATION ROOM.

Question 1

A fuel retail chain has fuel stations in several suburbs across Harare. The table below shows the number of cars stopping for filling in three suburbs: Mbare, Hopley and Churu during several weeks picked at random in 2023. The data are in thousand of cars per week.

Mbare	9.1	15.1	8.8	10	7.5	10.5	8.3	9.1	6	5.8	12.1	9.3
Hopley	4.7	5	4.2	3.3	5.5	2.2	4.1	2.6	3.4	7		
Churu	5.8	7.1	6.4	4.4	5.7	4.2	8.7	2.9	8	7.7	7	

- a. Develop a 95% confidence interval of the difference between the population means for Mbare and Churu. (6 marks)
- b. Test at the 5% significance level whether there is a difference between the population means for Mbare and Churu. (7 marks)
- c. In one planning meeting, the managing director of that fuel chain argues that there exists no difference across the three locations and no station requires downsizing. Following all the steps for hypothesis testing, test the MDs assertion at the 5% level of significance. (12 marks)

Question 2

The table below shows quarterly tourist arrivals at a holiday resort over the past three years from 2017.

Quarter	2018	2019	2020	2021	2022	2023
1	1690	1800	1990	2100	2281	2190
2	960	880	1200	1100	2004	1989
3	2720	2800	3115	2930	2722	2200
4	2670	2300	2615	2510	2500	2156

- Construct a time series plot and identify the pattern that exists in the data? (2 marks)
- Deseasonalize the time series. (12 marks)
- Briefly explain the rationale behind decomposing a time series. (3 marks)
- Explain situations in which qualitative forecasting methods may be superior to quantitative forecasting. (8 marks)

Question 3

- Suppose the following data is available as salaries for a sample of male and female workers in the public service performing roughly the same type of work.

	1	2	3	4	5	6	7	8	9	10	11	12
Men	219	97	176	280	211	204	241	207	163	202	144	164
Women	551	414	487	688	439	677	410	247	453	717	376	600

- Your colleague argues that the median income for women is \$696; test whether the hypothesis is true at the 5% significance level. (6 marks)
- Using the Mann Whitney Wilcoxon test, test whether there is a gender based difference in salaries in the public service in question. (8 marks)

- Suppose you are told that F and Y in the table above are fertilizer applied in kilograms and potato yield in boxes for different 10 plots.

plot	1	2	3	4	5	6	7	8	9	10	11	12
F	219	97	176	280	211	204	241	207	163	202	144	164
Y	551	414	487	688	439	677	410	247	453	717	376	600

- i. Using the Spearman rank-correlation at 5% level test whether there is a relationship between fertilizer application and tomato yield. (6 marks)
- ii. Explain how the spearman rank coefficient is interpreted highlighting situations where it can be used. (5 marks)

Question 4

- a) Explain the importance of time based indexes, relative regional indexes and weighted indexes in applied statistics. (6 marks)
- b) Consider the data given in the table below:

Item	Quantity (2010)	Price (2010)	Quantity (2023)	Price (2023)
M	85	9.10	62	11.76
N	18	22.45	21	18.67
O	8050	1.11	8050	1.19
P	3	16.43	3	22.34
Q	6	41.31	6	51.09
R	23	16.66	28	19.99
S	54	8.00	66	11.00

- i) Compute an unweighted aggregate price index for the product. (4 marks)
- ii) Compute the Laspeyres and the Paasche price index for the above product. (8 marks)
- iii) Compute an unweighted aggregate price index for the product. (4 marks)
- c) Why would a researcher use rolling indexes in applied statistics? (3 marks)

END OF PAPER