BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

PROGRAMMES: BSc HONOURS DEGREE IN ECONOMICS

EC 203: QUANTITATIVE METHODS

DURATION: 3 HOURS JUN 2024

INSTRUCTIONS:

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

Question 1

a) Suppose you are invited to assist a fellow student with data analysis and you find him with the information shown in the table below. The student reveals that he collected household income data from Mabvuku (M) and Westgate (W).

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

i) Suppose it is hypothesized that the median household income for Mabvuku is $196, test whether the hypothesis is true at the 5% significance level. **(6 marks)**

ii) Using the Mann Whitney Wilcoxcon test, test whether there is a difference between the incomes of the two communities. **(8 marks)**

b) Suppose you are told that M and W in the table above are fertilizer applied in kilograms and tomato yield in boxes for different 10 plots.

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 2

a) The table below shows data on 12 weeks of tourists arrival at a local tourist resort;

Week	1	2	3	4	5	6	7	8	9	10	11	12
Arrivals	55	41	48	88	43	67	41	24	45	77	37	60

i) Construct a time series plot and identify the type of pattern that exists in the data. **(3 marks)**

ii) Compute the exponential smoothing forecasts for α=0 .2. **(3 marks)**

iii) Compute the two week moving average forecast for the data **(2 marks)**

iv) Which of the two forecasting methods computed above provides more accurate forecasts based on MSE? **(4 marks)**

b) The table below shows quarterly tourist arrivals for the same resort mentioned in a) for the years 2018 to 2023.

Quarter	2018	2019	2020	2021	2022	2023
1	1590	1800	1990	2100	2300	1433
2	1060	860	1200	900	880	980
3	2720	2800	3515	2970	3000	3310
4	2470	2700	2615	2510	2444	2800

i) Construct a time series plot and identify the type of pattern that exists in the data. **(3 marks)**

ii) Deseasonalise the series. **(10 marks)**

Question 3

The number of domestic violence cases reported is likely to be dependent on the socio-cultural characteristics of the location the families reside. Data collected by a women advocacy group for 3 geographic locations over the year 2022 is shown in the table below;

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Urban	25	70	60	85	95	90	80	42	81	66	71	62
Farm	60	20	30	75	40	35	65	56	96	88	78	98
Rural	50	70	60	80	90	70	75	45	72	82	75	67

a) It is normally argued that domestic violence is higher in farm populations than in urban areas. At the 95% significance test whether that assertion is true. **(5 marks)**

b) Compute the 95% confidence interval estimate of the population variance for the rural population. **(8 marks)**

c) Another advocacy group that deals largely with farm population argued that the domestic violence in the three locations is not the same, but rather high for farm populations and hence there is need to design location specific policies. Using one way analysis of variance test at the 5% significance level is there any difference in domestic violence amongst the three locations? **(12 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 (2014)	Price (2014)	Quantity (2021)	Price (2021)
A	85	9.10	62	11.76
R	18	22.45	21	18.67
B	8050	1.11	8050	1.19
D	3	16.43	3	22.34
W	6	41.31	6	51.09
M	23	16.66	28	19.99
P	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