BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERCE

DEPARTMENT OF ECONOMICS

MSc ECONOMICS

ECONOMETRIC PRINCIPLES AND DATA ANALYSIS 2 (MEC 536)

EXAMINATION **DURATION: 3 HOURS**

INSTRUCTIONS TO CANDIDATES

1. Answer question 1 in Section A and any other three questions from Section B.
2. Question 1 carries 40 marks.
3. All the questions in Section B carry equal marks of 20 each.
4. Cell-phones are not allowed into the examination room.

SECTION A (COMPULSORY)

Question 1

a) The following table of test results has been derived for a system of 5 variables using the Johansen maximum likelihood procedure.

r	Trace test	5% critical val.	Lambda-max test	5% critical val.
1	15.4	8.08	11.1	8.1
2	24.1	17.8	17.3	14.6
3	29.1	31.2	19.2	21.3
4	33.4	48.4	24.1	27.3
5	37.3	69.9	26.7	33.2

i) Specify the conditions necessary to use the Johansen procedure to test for cointegration.

(3 marks)

ii) Interpret the two tests and determine the cointegrating rank of the system? **(7 marks)**

b) Assume the following AR(1) model:

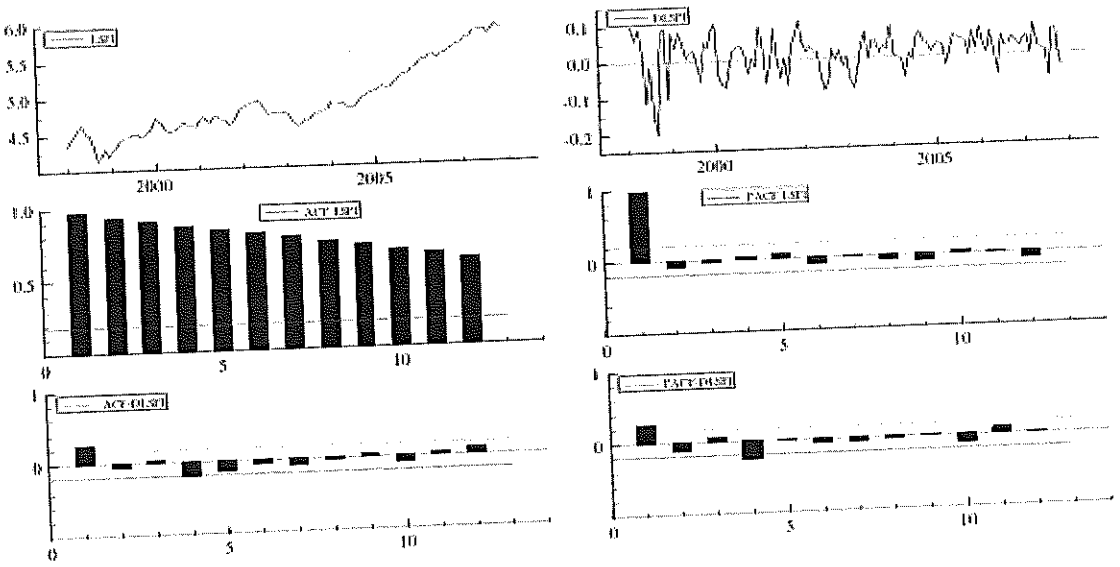
$$x_t = px_{t-1} + \varepsilon_t,$$

where εt~NID(0,σ2),

i) Distinguish between an AR(1) model and an AR (3) model. **(3 marks)**

ii) Explain the differences of performing inference on the estimated p, when p <1.0 and when p=1.0. **(6 marks)**

c) Consider the following information about the (log) share price index in South Africa:



In addition you have the following information:

LSPI: ADF tests (T=111, Constant+Trend; 5%=-3.45 1%=-4.04)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
8	-0.7737	0.97715	0.04570	-0.2160	0.8294	-6.077	
7	-0.8371	0.97588	0.04549	-0.4694	0.6398	-6.095	0.8294
6	-0.9516	0.97322	0.04531	0.0089	0.9929	-6.111	0.8761
5	-0.9705	0.97327	0.04509	0.2277	0.8203	-6.129	0.9663
4	-0.9500	0.97432	0.04489	-1.6200	0.1083	-6.146	0.9886
3	-1.189	0.96795	0.04523	0.4846	0.6290	-6.139	0.7233
2	-1.128	0.97012	0.04507	-1.6750	0.0969	-6.155	0.7974
1	-1.479	0.96130	0.04545	1.5670	0.1200	-6.147	0.5654
0	-1.215	0.96848	0.04575			-6.142	0.4194

LSPI: ADF tests (T=111, Constant; 5%=-2.89 1%=-3.49)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
8	0.5070	1.0062	0.04574	-0.3337	0.7393	-6.084	
7	0.4406	1.0052	0.04554	-0.5881	0.5578	-6.101	0.7393

6	0.3042	1.0035	0.04540	-0.0968	0.9231	-6.115	0.7972
5	0.2907	1.0032	0.04518	0.1349	0.8929	-6.133	0.9266
4	0.3347	1.0036	0.04497	-1.7080	0.0905	-6.151	0.9750
3	-0.0037	0.9999	0.04537	0.3612	0.7186	-6.142	0.6543
2	0.07023	1.0007	0.04519	-1.8410	0.0684	-6.158	0.7520
1	-0.3366	0.9966	0.04569	1.3980	0.1649	-6.145	0.4627
0	-0.09242	0.9990	0.04589			-6.145	0.3791

Use the information given above to answer the following questions:

i) Judging from the graphs, what type of process would be suitable for modeling the series? Motivate your answer as extensively as you can. **(4 marks)**

ii) Is the series a random walk and is it integrated of order one? Motivate your answer. **(4 marks)**

d) Consider the following estimated model:

$$\Delta \ln Cons_t = \beta_0 + \beta_1 \Delta \ln GDP_t + \beta_2 \Delta \ln CPI_t + \beta_3 \Delta R60c_t + e_t$$

where Δ is the first difference operator, GDP is gross domestic product, CPI is consumer price index, R60c is the three-month treasury billl rate.

The present sample is: 1969 (2) to 1994 (1)

Variable	Coefficient	Std.Error	t-value	HCSE
Constant	0.01692	0.00338	5.001	0.004597
Δ ln GDPt	0.36086	0.09173	3.934	0.093796
Δ ln CPIt	0.25917	0.16066	1.613	0.241880
Δ R60c t	0.00131	0.00103	1.269	0.001131

$R^2 = 0.174366$ $F(3,96) = 6.7581$ [0.0003] DW = 2.35

RSS = 0.02298197499 for 4 variables and 100 observations

AR 1- 2 F(2, 94) = 1.8497 [0.1630]

ARCH 4 F(4, 88) = 2.6102 [0.0408] *

Normality Chi^{2+} (2)= 4.4048 [0.1105]

RESET F(1, 95) = 0.94744 [0.3328]

Comment on the estimated model and its results. Can the estimation be improved? **(6 marks)**

e) i) What are the differences between a martingale and a random walk? **(4 marks)**

ii) What is meant by a GARCH(1,1) in mean process? **(3 marks)**

[40 marks]