

**Birla Institute of Technology & Science, Pilani, Pilani Campus – Rajasthan**  
**Mid-Sem (Closed Book) ECON F 215 [Computational Methods for Economics]**

**Maximum Marks: 35**

**Time Duration: 90 Minutes**

**Dated: 13/March/2023**

**Instructions:**

- Read the questions thoroughly before answering. All questions are compulsory. Start each question on a new page.
  - Calculation(s) to arrive at the result(s) and its Interpretation are necessary to get marks.
  - Calculator is allowed.
  - Make sure that you have correctly mentioned your Name, ID, Course, and other details on your answer sheet.
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**Question 1:** from the data for the period 1971-I to 1998-IV for Canada, the following regression results were obtained: **[2+2+1+1+2=8 Marks]**

$$\ln M1_t = -10.2571 + 1.5975 \ln GDP_t \quad (1)$$

$$t = (-12.9422) \quad (25.8865); R^2 = 0.9463 \text{ and } d = 0.3254$$

$$\Delta \ln M1_t = 0.0095 + 0.5833 \Delta \ln GDP_t \quad (2)$$

$$t = (2.4957) \quad (1.8958); R^2 = 0.0885 \text{ and } d = 1.7399$$

$$\widehat{\Delta \mu}_t = -0.1958 \widehat{\mu}_{t-1} \quad (3)$$

$$t = (-2.2521); R^2 = 0.118 \text{ and } d = 1.4767$$

where M1 = money supply, GDP = gross domestic product, both measured in billions of Canadian dollars, ln is natural log, and  $\widehat{\mu}_t$  represent the estimated residual from regression (1)

(a) Interpret regression (1) and (2)

(b) Do you suspect that regression (1) is spurious? Why?

(c) Is regression (2) spurious? How do you know?

(d) From the results of regression (3), would you change your conclusion in (b)? why?

$$(e) \Delta \widehat{\ln M1}_t = 0.0084 + 0.7349 \Delta \ln GDP_t - 0.0811 \widehat{\mu}_{t-1}$$

$$t = \quad (2.0496) \quad (2.0636) \quad (-0.8537)$$

$$R^2 = 0.1066 \text{ and } d = 1.6697$$

What does this regression tell you? Does you decide if regression (1) is spurious or not?

**Question 2:** consider the following second order difference equation

**[4 Marks]**

$$y_t = 0.6y_{t-1} + 0.2y_{t-2} + \epsilon_t$$

Show that the process of  $y_t$  is stable/unstable. Why

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**Question 3:** Let Sachin and Dhoni be two real estate agents. Let X and Y be the number of houses they sell in a month. Based on past sales, we estimated the following joint probabilities for X and Y

**[10 Marks]**

		X		
		0	1	2
Y	0	0.12	0.42	0.06
	1	0.21	0.06	0.03
	2	0.07	0.02	0.01

- Find their marginal probabilities
- What are their probability mass function
- Calculate the Expected value of X and Y.
- Calculate the Variance of X and Y.
- Find the covariance of X and Y.

**Question 4:** Prove that  $cov[Y_{t-1}, (\varepsilon_t - \lambda\varepsilon_{t-1})] = -\lambda\sigma^2$

**[3 Marks]**

**Question 5:** Let  $\{\varepsilon_t\}$  be white noise and consider the MA(1) process as  $Y_t = \alpha + \varepsilon_t + \theta\varepsilon_{t-1}$ , where  $\alpha$  and  $\theta$  could be any constants. Find the autocorrelation for the above MA(1) process.

**[5 Marks]**

**Question 6:** Find the canonical correlation of x ( $R_x$ ) for the given value.

**[5 Marks]**

Sl No	1	2	3	4	5	6
X1	120	109	130	121	135	140
X2	76	80	82	78	85	87
Y1	165	180	170	185	180	187
Y2	60	80	70	85	90	87

**\*\*\*\*\*All the Best\*\*\*\*\***