



UNIVERSITY OF ESWATINI

FIRST SEMESTER MAIN EXAMINATION PAPER, NOVEMBER 2019

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

COURSE CODE: ECO 205/ ECO 205(IDE) / ECON 208

TITLE OF PAPER: MATHEMATICS FOR ECONOMISTS I

TIME ALLOWED: 2 HOURS

Instructions

1. This paper consists of Section (A) and (B).
2. Section A is compulsory.
3. Answer any two questions from Section B.
4. Show all relevant workings to your answer

Special Requirements

Scientific calculator

Candidates may complete the front cover of their answer book when instructed by the Chief Invigilator and sign their examination attendance cards but must NOT write anything else until the start of the examination period is announced.

No electronic devices capable of storing and retrieving text, including electronic dictionaries and any form of foreign material may be used while in the examination room.

DO NOT turn examination paper over until instructed to do so.

SECTION A

QUESTION 1 (Compulsory)

(40 Marks)

- a) Write short explanatory notes on the following: (5 Marks each)
- i) Differentiate between Sales Tax and Personal Income Tax. (5)
 - ii) Differentiate between the producer revenue for a flat-rate tax & the producer revenue when the tax is a percentage of price. (5)
 - iii) Differentiate between an endogenous variable & an exogenous variable. (5)
 - iv) Autonomous consumption. (5)
 - v) Motives for holding money (5)
- b) The demand and supply functions for a product are:
- $Q_d = 480 - 15P$
 $Q_s = 50P - 40$
- i) Determine the equilibrium values of P and Q, and also find the producer's revenue that these equilibrium values imply? (7)
 - ii) A flat-rate tax of E4 is imposed on each unit sold. Determine the new equilibrium values. (4)
 - iii) What effect does the flat-rate tax have on the tax revenue and the producer revenue? (4)

SECTION B

Answer Any Two (2) of the Following Questions:

(30 Marks Each)

QUESTION 2

a) Suppose that the Eswatini economy is defined by the following national income model:

$$Y = C + I + G$$

$$C = 150 + 0.08Y^d$$

$$I = 75 - 20i$$

- i) Given that $T = 3 + 0.02Y$ and $G = 3000$; determine the IS equation. (5)
- ii) If the transaction-precautionary demand for money is given by $L_1 = 0.2Y$ and the speculative demand for money is $L_2 = 75 - 20i$; Money supply is fixed at $M_s = 1500$; determine the LM equation. (5)
- iii) What will be the equilibrium values of income and interest rate in this closed economy? (5)

b) Evaluate the following determinant using the Laplace method. (8)

$$\begin{vmatrix} 5 & 6 & 1 \\ 2 & 3 & 0 \\ 7 & -3 & 0 \end{vmatrix}$$

c) Find the inverse of the following matrix: (7)

$$\begin{bmatrix} 4 & 1 & -5 \\ -2 & 3 & 1 \\ 3 & -1 & 4 \end{bmatrix}$$

QUESTION 3

- a) Determine the total demand for industries 1, 2 and 3, given the matrix of technical coefficients A and the final demand vector B below: (15)

	Output industry			
	1	2	3	
A =	0.2	0.3	0.2	B =
	0.4	0.1	0.3	
	0.3	0.5	0.2	
				$\begin{bmatrix} 150 \\ 200 \\ 210 \end{bmatrix}$

- b) Use the Jacobian to test for functional dependence in the following system of equations: (15)

$$y_1 = 6x_1 + 4x_2$$

$$y_2 = 7x_1 + 9x_2$$

QUESTION 4

- a) Derive the Marshallian demand function, given that the utility function and budget constraint are: (10)

$$U = 3x + xy + 2y \quad \text{and} \quad P_x x + P_y y = B$$

- b) Estimate the demand for x at $P_x = 2, 4$, when $B = 60, P_y = 4$. (5)
- c) Estimate the demand for y at $P_y = 2, 4$, when $B = 60, P_x = 4$. (5)
- d) Use Cramer's rule to solve the following system of equations: (10)

$$2x_1 + 6x_2 = 22$$

$$-x_1 + 5x_2 = 53$$

*****GOOD LUCK*****