

International Islamic University Chittagong (IIUC)
Department of Economics & Banking
Midterm Examination; Autumn-2023
Program: BSS (Honors)

Course Code: MATH-2302

Course Title: Mathematical Economics

Time: 1 hours & 30 minutes

Full Marks: 30

N.B. Answer the following questions. All parts of a question must be answered sequentially.

1. (a) Explain the following types of the matrices with example: Square Matrix, Identity Matrix, Vector

- (b) Consider the following Matrix

1

CLO-1

PLO-3

$$A = \begin{bmatrix} 2 & 4 & -4 \\ 0 & -1 & 3 \\ 2 & -3 & 9 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & -2 & 0 \\ 6 & 3 & 2 \end{bmatrix}$$

Find A+B and A-B

- (c) Consider the following Matrix

6

Understand,
Analyze

$$A = \begin{bmatrix} 4 & 1 & -1 \\ 0 & 3 & 2 \\ 3 & 0 & 7 \end{bmatrix}$$

- i. Determine the cofactor matrix of A
- ii. Find the determinant of A
- iii. Find the inverse matrix of A

Or

1. (a) Consider the following Matrix

$$A = \begin{bmatrix} 4 & 1 & -7 \\ 0 & 3 & 2 \\ 3 & 0 & 7 \end{bmatrix} \text{ and } B = \begin{bmatrix} 6 & 3 & 1 \\ 1 & 4 & -2 \\ 4 & -1 & 5 \end{bmatrix}$$

3

Prove the properties of transpose from A and B

- (b) Solve the following equation by Cramer's rule

7

CLO-1
PLO-2

Understand,
Analyze

$$-x_1 + 3x_2 + 2x_3 = 24$$

$$x_1 + x_3 = 6$$

$$5x_2 - x_3 = 8$$

2. (a) Let $Q = f(K, L)$ if the function is a linear homogeneous production function then state the properties of this function.

3

Apply
Create

- (b) Given production function $Q = 95K^{0.5}L^{0.5}$

7

CLO-2
PLO-1

- i. Calculate MPP_L and MPP_K and show that marginal product of factors can be expressed as capital labor ratio.

- ii. Show that this production function satisfy the Euler's theorem

- iii. Calculate the elasticity of substitution of this function

3. (a) Determine whether the following functions are homogenous. If so, of what degree

3

Understand,
Apply
Create

$$i. Z = 2x + y + \sqrt{xy}$$

$$ii. Z = x^3 + 3x^2w + 2y^2w$$

$$iii. Z = x - y + xy - 2.5$$

CLO-2
PLO-1

- (b) Given the production function $Q = 115K^{0.3}L^{0.7}$

7

- i. Show that Iso-quants of that function are downwards sloping and convex to the origin.

- ii. Find the equation of expansion path and show that would be straight line stemming from the point of origin.

- iii. Calculate the labor and capital share.