Assignment I

Carleton University
Department of Economics
Econ 3001B- Winter 2023
Due date: 01 March 2023

Please show all your work and upload your work in PDF format into Brightspace.

Question 1 (25 marks)

Solve the following:

(a)

$$\begin{bmatrix} 27 & 44 & 51 \\ 35 & 39 & 62 \\ 33 & 50 & 47 \end{bmatrix} + \begin{bmatrix} 25 & 42 & 48 \\ 33 & 40 & 66 \\ 35 & 48 & 50 \end{bmatrix}$$

(b) Solve AB and BA, where

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} B = \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$$

(c) Compute $(A+B)^T$, for A and B below:

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

Check that $(A+B)^T = A^T + B^T$.

Question 2 (25 marks)

Part (a)

Compute the following limits

(a) $\lim_{x\to -2}(x^2+5x)$

(b) $\lim_{x\to 4}\frac{2x^{3/2}-\sqrt{x}}{x^2-15}$

(c) $\lim_{x\to a} Ax^n$

Part (b)

Find an expression for dz in terms of dx and dy for the following:

(a) $z = Ax^a + By^b$

(b) $z = e^{xu}$, where $u = u(x, y)$.

(c) $z = ln(x^2 + y)$

Question 3 (25 Marks)

Find A^{-1}

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

Question 4 (25 marks)

Consider the National -Income model with 3 endogenous variables, Y (national income), C (consumption), and t (taxes)

$$Q = a - bP \qquad (a, b > 0) \qquad \text{[demand]}$$
$$Q = -c + dP \qquad (c, d > 0) \qquad \text{[supply]}$$

(a) Derive p^* and Q^* in equilibrium (when quantity supplied = to quantity demanded)

(b) Examine the comparative-static properties of the equilibrium quantity and provide the economic meaning of it? (Note compute partial derivatives of p^* with respect to parameters in the model. We discuss this in details in class during lecture)