ECON 331 Midterm Exam

FEBRUARY 16, 1998

Name _____

1. Given the matrix

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

   Find the determinant using Laplace Expansion. **Show ALL Steps.**

2. This problem is a Leontief input-output problem: To produce one unit good one (x_1) you need 0.4 units of x_1 and 0.2 units of x_2. To produce one unit of good two (x_2), you need 0.6 units of x_1 and 0.1 units of x_2. The final market demands for both goods are 100 each. **USE MATRIX INVERSION to find the correct amounts of $\mathbf{x}_1$ and $\mathbf{x}_2$** (*Hint: Start with (I-A)x = d)*

3. Consider the following two market model

$$Q_1^d = 20 - P_1 + 2P_2 \qquad Q_1^s = 2P_1 - 2$$
$$Q_2^d = 18 - 2P_2 + 3P_1 \qquad Q_2^s = 2 + 4P_2$$

   (a) What relationship in demand do these goods have?

   (b) Use Cramer's rule to find the inverse demand functions

$$P_1 = P_1(Q_1, Q_2) \qquad P_2 = P_2(Q_1, Q_2).$$

4. (a) Let $q = f(L)$ be the short run production function where L represents labour, the only input. use calculus to show that when $MP_L > AP_L$, AP_L is rising and $MP_L < AP_L$, AP_L is falling.

   (b) When $MP_L = AP_L$, AP_L is assumed to be at a maximum and not a minimum. What assumption about the second derivative of $f(L)$ ensures this result? What is the economic expression for this result?

5. (20 marks) Consider an open economy where equilibrium in the goods market is characterized by

$$I(Y, i) + G_0 + X(E) = S(Y, i) + T(Y) + M(Y, E)$$

   and in the money market

$$L(Y, i) = M_0^S$$

   with the balance of payments are

$$X(E) - M(Y, E) + K(i, i_w)$$

$$\textit{where} \quad K_i \geq 0, \quad K_{i_w} \leq 0$$

   where E is the U.S. price of the Canadian dollar and i_w is the world interest rate.

1. What are the normally assumed signs of the partial derivatives of I, S, T, and L with respect to Y and i? In particular, what do we often assume about the partial derivative $\partial I/\partial Y$?
2. Derive and expression for the slope of the IS curve. Show it's sign.
3. Do any of the partial deriatives have restrictions on the range of values they may take on?
4. In equilibrium this system implicitly defines Y and i as functions of G_0, i_w, and M_0^s. Write down the Jacobian of this system. Assume $(L_y K_i + L_i M_y) > 0$.
5. Find an expression for $\partial Y/\partial M_0^s$ and $\partial E/\partial M_0^s$. What are their signs?