ECONOMICS 331
Mathematical Economics
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Homework Assignment #1

[1] Two markets for two commodities interact with each other in the sense that the demand for each product depends not only on its own price, but also on the prices of other products. Suppose that the demand functions are as follows:

$$q_1^d = 20 - 2p_1 + p_2 \qquad q_2^d = 25 + p_1 - 3p_2$$

Suppliers are assumed willing to produce these two products according to the following supply functions

$$q_1^s = 2p_1 \qquad q_2^s = 2p_2$$

a) What relationship in consumption do these two product have?
b) Find an expression for their inverse demand functions.
(i.e. write as $p_i = f(q_i, q_j)$)
c) Find the market clearing prices and quantities for both goods. Graph your results

[2] Find the vector x satisfying the matrix equation $\mathbf{A}(\mathbf{x} + \mathbf{c}) = \mathbf{d}$
where

$$A = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix} \qquad A^{-1} = \begin{bmatrix} 3 & -1 \\ -2 & 1 \end{bmatrix} \qquad c = \begin{bmatrix} 4 \\ 2 \end{bmatrix} \qquad d = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

[3] Consider the following macroeconomic model:

	goods market		money market
1	$Y = C + I + G_0$	1	$M^d = kY - \beta r$
2	$C = C_0 + b(Y - T)$	2	$M^d = M_0^s$
3	$I = I_0 - \alpha r$		
4	$T = tY$		

a) Use equations 1 through 4 to find an expression for the IS curve (Y as a function of r). Use equations 5 and 6 to find an expression for the LM curve (Y as a function of r).

b) Graph the IS and the LM with r on the vertical axis and Y on the horizontal axis.(Hint: invert the two equations you derived in **a**)
c) Write the two equations in matrix form (i.e. $Ax = d$); where the x vector contains two elements, Y and r. (Hint: A is 2×2)