ECN 485 ASSIGNMENT 2 Spring 1998

Due March 25 (Wednesday)

1. (30 pts, 6 pts. on each.) Let

$$u = \begin{bmatrix} 2 \\ 0 \\ -1 \\ 3 \end{bmatrix}; \; v = \begin{bmatrix} 5 \\ 4 \\ 7 \\ -1 \end{bmatrix}; w = \begin{bmatrix} 6 \\ 2 \\ 0 \\ 9 \end{bmatrix}$$

(a) Find 7u + 3w
(b) Find 2u - (v + w)
(c) Find $u'v$
(d) Can u, v and w span $\mathbb{R}^4$? Why or Why not? Explain it.
(e) Check whether w can be a linear combination of u and v.

2. (10 pts.) Show that there do not exist scalars a, b, c such that $av_1 + bv_2 + cv_3 = w$, where

$$v_1 = \begin{bmatrix} 0 \\ 1 \\ -2 \\ 1 \end{bmatrix}; \; v_2 = \begin{bmatrix} 0 \\ 2 \\ 1 \\ 2 \end{bmatrix}; \; v_3 = \begin{bmatrix} -2 \\ 1 \\ 4 \\ 1 \end{bmatrix}; \; w = \begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \end{bmatrix}.$$

(Hint: Think about the link between a matrix and its column vectors.)

3. (10 pts.) Answer the following questions.

(a) Find $\lim_{x\to1}(x^3 - 7x^2 + 15x - 9)/(x^2 + 2x - 3)$.
(b) Find $\lim_{x\to\infty}(2 - 3x + x^2)/(7 + 4x - 5x^2)$.

4. (20 pts.) Find dy/dx for each case.

(a) $y = \{(x - 1)/(x + 1)\}^2$
(b) $y = 3(2x^3 + 2)^4$
(c) $y = x^2e^{4x}$.
(d) $y = 4\bullet\ln(x^4+3x^3+1)$.

5. (10 pts.) Consider the following functions:

$f(x_1, x_2) = 6x_1^2 + 2x_2 + 1$
$g(x_1, x_2) = 3x_1 - x_2^3 + x_1x_2$

(a) Find $\partial\{f(x_1, x_2)g(x_1, x_2)\}/\partial x_1$ at $(x_1, x_2) = (1, 1)$.
(b) Find $\partial\{f(x_1, x_2)/g(x_1, x_2)\}/\partial x_2$ at $(x_1, x_2) = (1, 1)$.

6. (10 pts.) Answer the following questions.

(a) Given $z = 2x + xy - y^2$ and $x = 3y^2$, find dz/dy at $y = 1$.
(b) Let $z = x_1/x_2 + uv$, $x_1 = u^2 + uv$, and $x_2 = u + v$. Find $\partial z/\partial u$ at $(u, v) = (1, 1)$.

7. (10 pts.) Consider the production function: $Q = AK^aL^b$, where A, a and b are positive constants. Here, K and L denote amounts of capital and labor, respectively. Assume that $K > 0$ and $L > 0$.

(a) For what restriction on the values of a and b does the equality $MP_KK + MP_LL = Q$ hold?
(b) Assuming K is constant, show that b equals the elasticity of Q with respect to L.